Handling a hot job at a cool $1400-a-year saving

They don't spare the belts around busy foundries like this one in the Midwest. And their shakeout conveyor was in a specially hot spot—handling smoking sand at temperatures well over 250°F., occasionally reaching a near-incandescent 450°F. Little wonder belt life averaged only 43 days.

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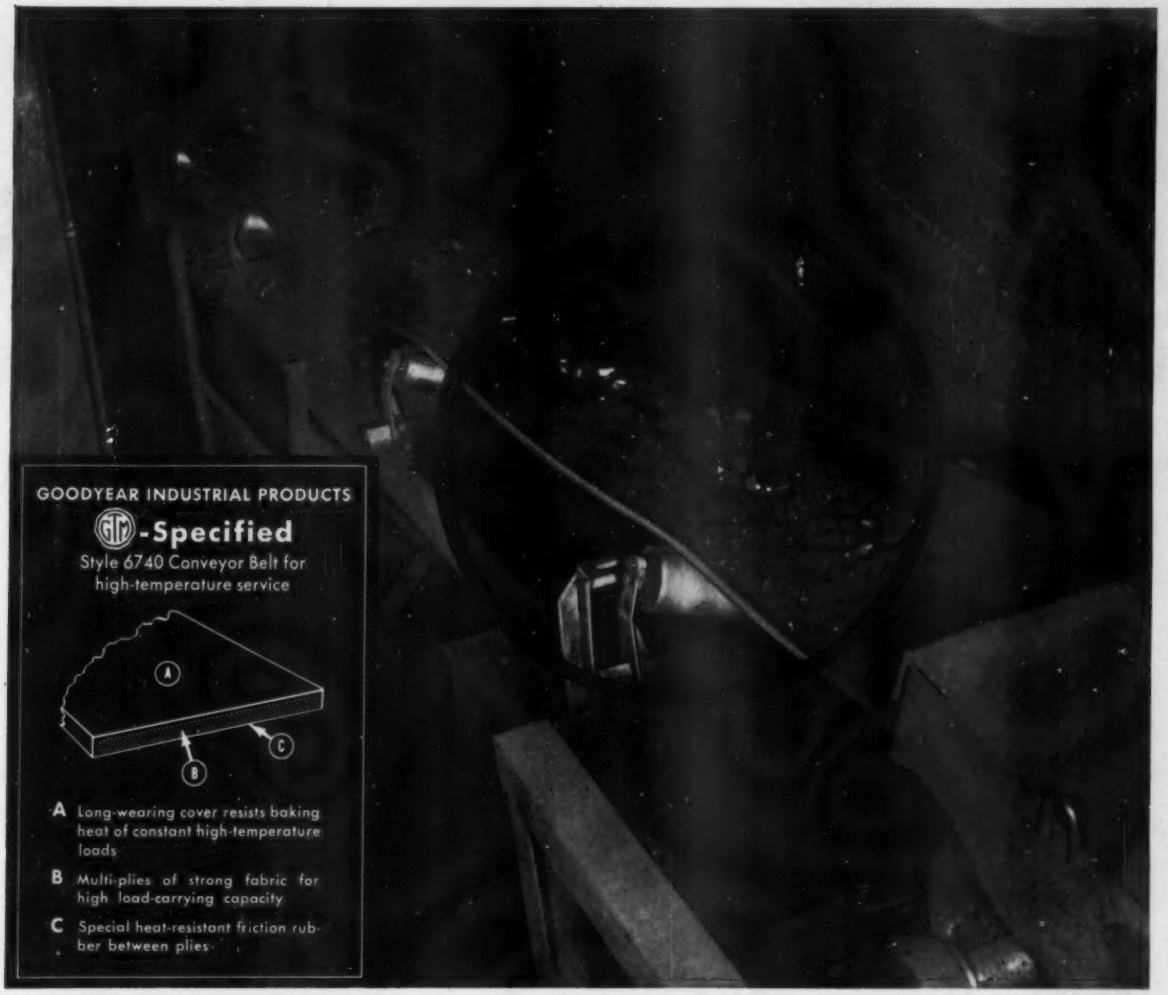
IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and non-rubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*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A
B
C
A Long-wearing cover resists baking heat of constant high-temperature loads
B Multi-plies of strong fabric for high load-carrying capacity
C Special heat-resistant friction rubber between plies

CONVEYOR BELTS BY

GOODYEAR

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'ROUND ABOUT

with the editors in field and office

Edited by R. L. Marinello

Amchem Promotes Russell

George Russell has been promoted from assistant to chief engineer of Amchem Products, Inc., Ambler, Pa. He has been with the company since 1947.

He is a member of the National Society of Professional Engineers and a past president of the Valley Forge Chapter of the American Institute of Plant Engineers.

Mr. Russell succeeds **Jay Biery,** who recently retired after 31 years with the company.

Lighting for Production

THIS IS THE title of a one-day clinic to be conducted at the Chicago Lighting Institute, 140 S. Dearborn St., Chicago, Illinois, on October 22.

Some of the subjects scheduled for this meeting are: Scientific Analysis and Determination of Lighting Needs for Individual Seeing Tasks; Industrial Lighting—Indoors; Industrial Lighting—Outdoors; Fluorescent and Mercury Vapor Ballasts and Circuits; Electrical Distribution Systems; Lighting Maintenance; and What You and Others Are Doing in Lighting.

Joseph Kucho, plant engineer of Link-Belt Company, and President of the Chicago Chapter of the American Institute of Plant Engineers, will be chairman of the afternoon session. One of the speakers at this afternoon session will be our electrical editor, Vern Kempf. His talk "What You and Others Are Doing in Lighting" will cover general, supplementary and inspection lighting.

Registration fee is $10. Reservations or requests for more information should be sent to Carl W. Zersen, Managing Director, Chicago Lighting Institute, 140 S. Dearborn St., Chicago 3, Illinois.

Fluid Handling Service

PUMP USERS can get some additional help in solving fluid-handling and pump problems from the new Design Service Department of the Vanton Pump Division of Cooper Alloy Corporation.

The prime function of the new department will be to give detailed advice on specific fluid-transfer problems.

For more information on this design service, write to Design Service Department, Vanton Pump Division, Cooper Alloy Corporation, Hillside, New Jersey.

November Conferences

A SPECIAL feature of the 11th Exposition of the Air-Conditioning and Refrigeration Industry at Atlantic City, N. J., from November 2 to 5, will be a conference session on Tuesday, November 3.

Outstanding authorities will speak on new developments and trends in such fields as commercial refrigeration, residential air-conditioning and commercial and industrial air-conditioning.

For additional information about this meeting write to Ted Kellogg, Air-Conditioning and Refrigeration Industry, 1346 Connecticut Ave., N. W., Washington 6, D. C.

The 41st edition of the National Metal Exposition and Congress will be staged at the International Amphitheatre, Chicago, from November 2 to the 6.

More than 275 technical presentations will be made in symposiums, panel discussions, seminars and formal sessions.

Information about the conference may be obtained by writing to American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Arc Welding Training Manual

ALL THE FACTS about arc welding are covered in a recently published training manual specifically designed for welders and instructors of manual metal-arc welding.

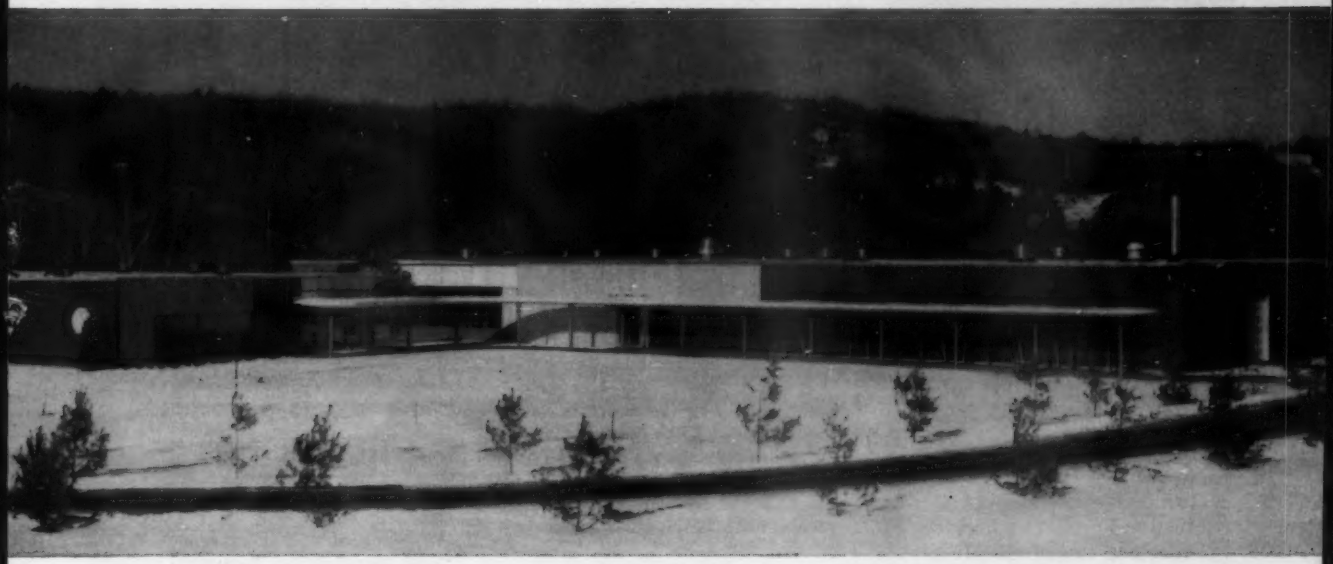
Contents include welding processes and recommended safety practices, the metal-arc process, accessories, exercises in arc welding, arc welding equipment, identification of metals, and their structure.

Fifty pages are devoted to arc

Subscriptions: U.S.A. $10, Canada $11. Other countries $12 per year. Single copies $1. Change of address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by the 15th of month to make the change effective with following month's issue. Published monthly and accepted as controlled circulation publication at Chicago, Ill.

One of the country's "TOP TEN" plants uses distinctive Natco clay brick

Appearance of building and grounds was one of the important selecting factors in the "top ten" competition.



Decorative and durable Natco black velour brick gives the Split Ballbearing plant in Lebanon, N.H., distinctive design. This plant (Division of Miniature Precision Bearings, Inc.) was designed by Carl Koelb & Associates, Architect, Weston, Mass.

Split Ballbearing's new plant in Lebanon, New Hampshire, was recently named one of the "top ten" plants constructed in the United States during 1958. Chosen by Factory Magazine, selection was based on beauty and utility. These qualities were needed in competing against more than 700 entrants.

One of the main considerations was the appearance of the plant exterior. Natco Ceramic Glaze Velour Brick was used on the outside wall construction. Versatile black velour brick serves a dual purpose. First, it is distinct in design . . . modern now *and* in the future. Second, it is durable . . . will help solve outside maintenance problems.

Velour brick is furnished in nine attractive colors, plus black and white. It is available in standard brick sizes and conforms to ASTM specifications. For more information, write for Circular CB-20.

Beauty and utility . . . Natco velour brick has them both

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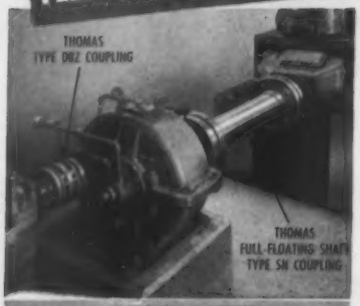

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'ROUND ABOUT

welding exercises and the various techniques can be mastered by following the instructions. Step-by-step illustrations show how each operation is performed, and each exercise details the material, electrode, amperage, voltage, polarity and the purpose of the particular exercise.

Copies of the AWS Training Manual of Arc Welding are available from the American Welding Society, 33 West 39th St., New York 18, N. Y., at a price of $3, post paid.

New Plant Engineer

Charles E. DeMars has been appointed plant engineer for Tranter Manufacturing, Inc., Lansing, Michigan. He will be responsible for tooling, equipment and plant layout.

Prior to joining the company, he spent more than 10 years in various supervisory plant positions in the Ainsworth Precision Casting Division, Harsco Corp., Springfield, Tenn. He has also had previous experience with several firms in the Detroit area.

Plant Maintenance and Engineering Conference-Show

PHILADELPHIA will be the meeting place for next year's Plant Maintenance and Engineering Conference and Show. The dates are January 25 through the 28. The conference will be held the first three days, January 25 through the 27.

More information about the papers to be presented at the conference will appear in this column at a later date.

Equipment Replacement Analysis

WHEN SHOULD plant equipment be replaced? Many companies have asked themselves this question over and over and hope that they are able to come up with the right answer.

To help you compare all the facts, Jones & Lamson has published a revised edition of their "Avoidable Costs" Replacement Formula. The formula itself is a simple, two-page form, which, when properly completed, presents a graphic picture of the costs involved in operating old equipment compared with new equipment. It will help you reach a sound decision about replacement.

Copies of the new booklet, together with work sheets, are available on request from Jones & Lamson branch offices, or by writing directly to Jones & Lamson Machine Company, Springfield, Vermont.

Engineering Ideas from Europe

HAVE YOU ever asked yourself this question: How can I learn at one glance the latest technical developments in Europe? If so, the answer is available to you now in the form of a monthly publication—the European Technical Digests.

Each month they publish a number of items on each of the following categories: glass, chemicals, corrosion, electrical engineering, fuel, lubricants, materials handling, metallurgy, safety, structural engineering, textiles, leather, timber and wood.

If you would like more information about this publication, address your inquiry to the Organization for European Economic Cooperation, European Productivity Agency Mission, Publications Office, Suite 1223, 1346 Connecticut Avenue, N. W., Washington 6, D. C.

Buildings, Walls, Panels

THESE ARE just a few of the many subjects which will be discussed at the multi-subject conferences to be held by Building Research Institute at the Shoreham Hotel in Washington, D. C., from November 16 through the 19.

Already scheduled are discussions and full-scale workshop sessions on sandwich panel design, architectural metal curtain walls, building research in the United States and overseas, and the problems of manufacturers whose products are used in component construction.

In five separate workshops there will be analyses of design criteria for exterior load-bearing and interior non-load-bearing walls, partitions, floors, ceilings and roofs.

Other segments of the conference program will be concerned with new heating techniques and the maintenance of industrial buildings.

One session will review the current advances in the documentation of building science literature.

Complete program and registration material may be obtained by writing to Harold Horowitz, Assistant Director of Technical Programs, Building Research Institute, 2101 Constitution Avenue, Washington 25, D. C.

Grinnell offers you a complete line of pipe hangers and supports

HERE ARE 24 TYPICAL EXAMPLES . . .

adj. swivel ring solid ring type fig. 101

adj. swivel ring split ring type fig. 104

split ring with socket fig. 107

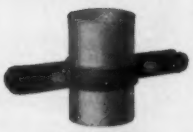
split ring with turnbuckle adjuster fig. 115

adj. wrought ring fig. 97

adj. wrought ring fig. 269

wrought pipe clamp fig. 212

adj. wrought clevis fig. 260


extension pipe or riser clamp fig. 261

extension split clamp hanger fig. 139

light welded-steel bracket fig. 194

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CB-Universal concrete insert fig. 282

wedge type concrete insert fig. 281

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malleable beam clamp with extension piece fig. 229

universal side I-Beam clamp fig. 225

single pipe roll fig. 171

adj. steel yoke pipe roll fig. 181

pipe roll complete fig. 271

Look this page over. Shown are some of Grinnell's pipe hangers and supports. In the *complete* line will be found a solution to *any* pipe suspension problem you may have.

The maximum recommended load ratings for hangers have been established by thorough testing in the Grinnell Research and Development Laboratories. They are based on a minimum safety factor of 5, or the allowable stresses specified in the ASA Code for Pressure Piping.

Many of Grinnell's hangers are listed by the Underwriters' Laboratories, Inc., and they are approved by the Factory Mutual Laboratories for use in fire protection systems. For any pipe suspension problem, look to Grinnell.

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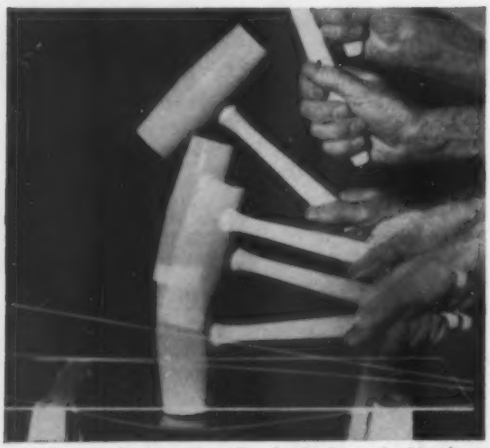

See how PLEXIGLAS "gives" under the force of a blow!

Sooner or later a plant window is likely to be slammed too hard . . . hit by a flying object . . . or bumped accidentally. The chances that it *won't break* are many times greater if it's glazed with PLEXIGLAS® acrylic plastic. Transoms, doors, windows, skylights and partitions need not be safety or maintenance problems for your company. PLEXIGLAS glazing is easy to install . . . resists chemicals and weather . . . drastically reduces replacement costs. Ask your Authorized Dealer. He's listed under PLEXIGLAS in the Plastics section of telephone directories in major cities.

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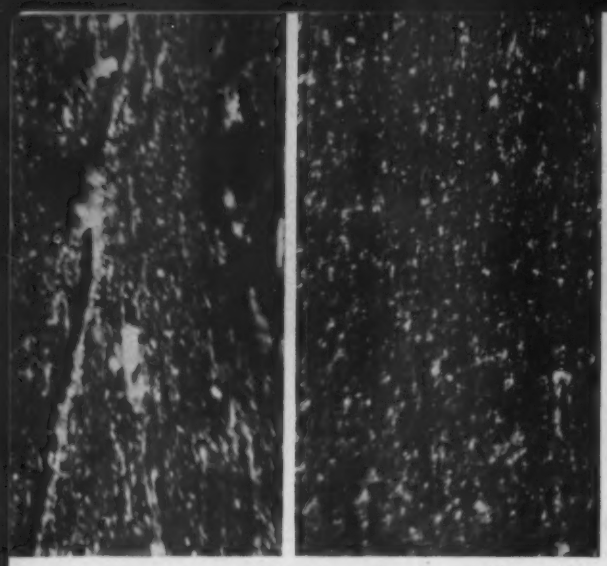
A BRAND-NEW PLANT FOR MAKING HIGH-VOLTAGE RUBBER-INSULATED CABLE... WHY ANACONDA BUILT IT... WHAT IT MEANS TO YOU

Butyl is the most effective rubber insulation yet developed—either natural or synthetic—for high-voltage cable. It has inherent resistance to aging, to moisture, to heat, and most important in high-voltage cable—to ozone.

But—butyl handles differently from other rubbers. And so it demands specialized engineering knowledge, highly specialized equipment, techniques, and precision control at every manufacturing step.

That briefly is why Anaconda built this huge plant at Marion, Indiana—to combine under one big roof the specialists and the specialized equipment needed to make the finest rubber-insulated cable available to you.

Turn the page to see how Anaconda Butyl (AB) Cable was developed and is manufactured. See how each step helps make a better cable for you.



Above you see magnified sections of ordinary cable insulation (left) and Anaconda Butyl (AB) Cable insulation (right).

These screens, used in the extrusion head to entrap possible contaminants, are so fine they actually hold water.

TWO BIG REASONS WHY ANACONDA BUTYL (AB)

1. SPECIALIZED DEVELOPMENT

Because Anaconda was the first to develop butyl-insulated cable—and because butyl handles differently from other rubbers—many problems came up during development. Here are some examples—and how Anaconda engineers solved them.

A mixing problem: Like all raw rubbers, butyl in its raw state is a practically useless material. So it's mixed with specially selected additives and ingredients. Because it is very difficult to disperse these ingredients in butyl, Anaconda had to develop an entirely new mixing process and separate facilities to avoid contamination. Look at the comparison photos and see how successful it is.

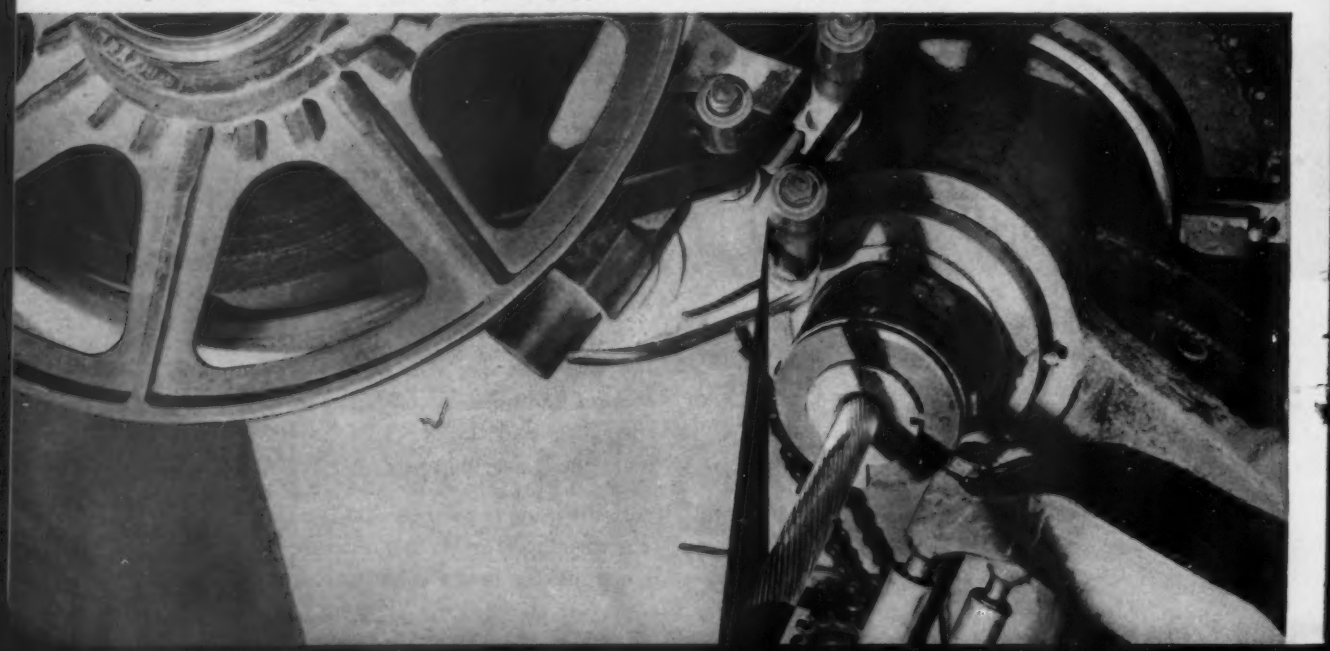
A shielding problem: To eliminate laborious and time-consuming cleaning of insulation surfaces, Anaconda developed a semiconducting tape* which firmly adheres to the insulation—and yet is easy to remove during splicing and terminating.

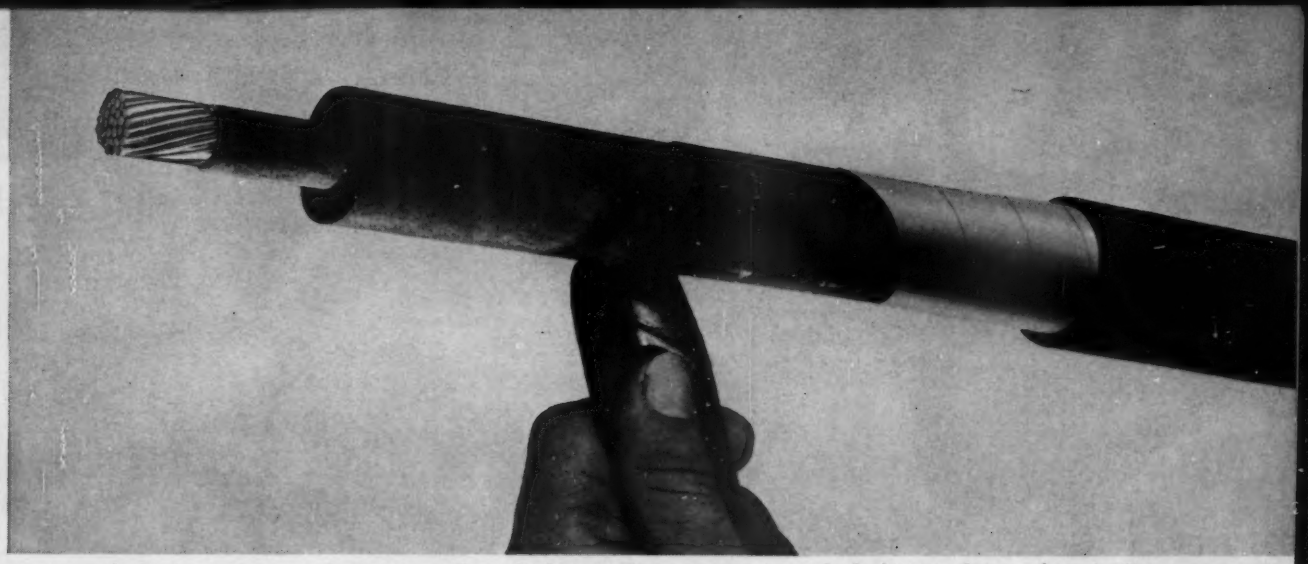
Even a vulcanizing problem: Ordinary vulcanizing equipment might have a tendency to deform butyl insulation. So Anaconda developed huge vulcanizing tanks which admit steam faster, vulcanize quicker and eliminate distortion.

These few examples show you the types of problems Anaconda engineers were up against. Their solutions help show you why you can be sure Anaconda Butyl (AB) Cable is the finest cable you can buy.

*Pat. applied for

Close-up of semiconducting strand-shielding tape being applied to 500-Mcm tinned copper conductor.





An Anaconda development—semiconducting tape—adheres firmly to insulation, yet removes easily, facilitating splicing and terminating.

MEANS RELIABLE HIGH-VOLTAGE CABLE

2. SPECIALIZED MANUFACTURE

Anaconda's new Marion Mill was designed to handle only one product—Anaconda Butyl (AB) Cable.

The men behind this highly specialized equipment have but one job . . . to study and improve the design and manufacture of rubber-insulated high-voltage cable. Here are a few of the many places where they built precision right into the production line.

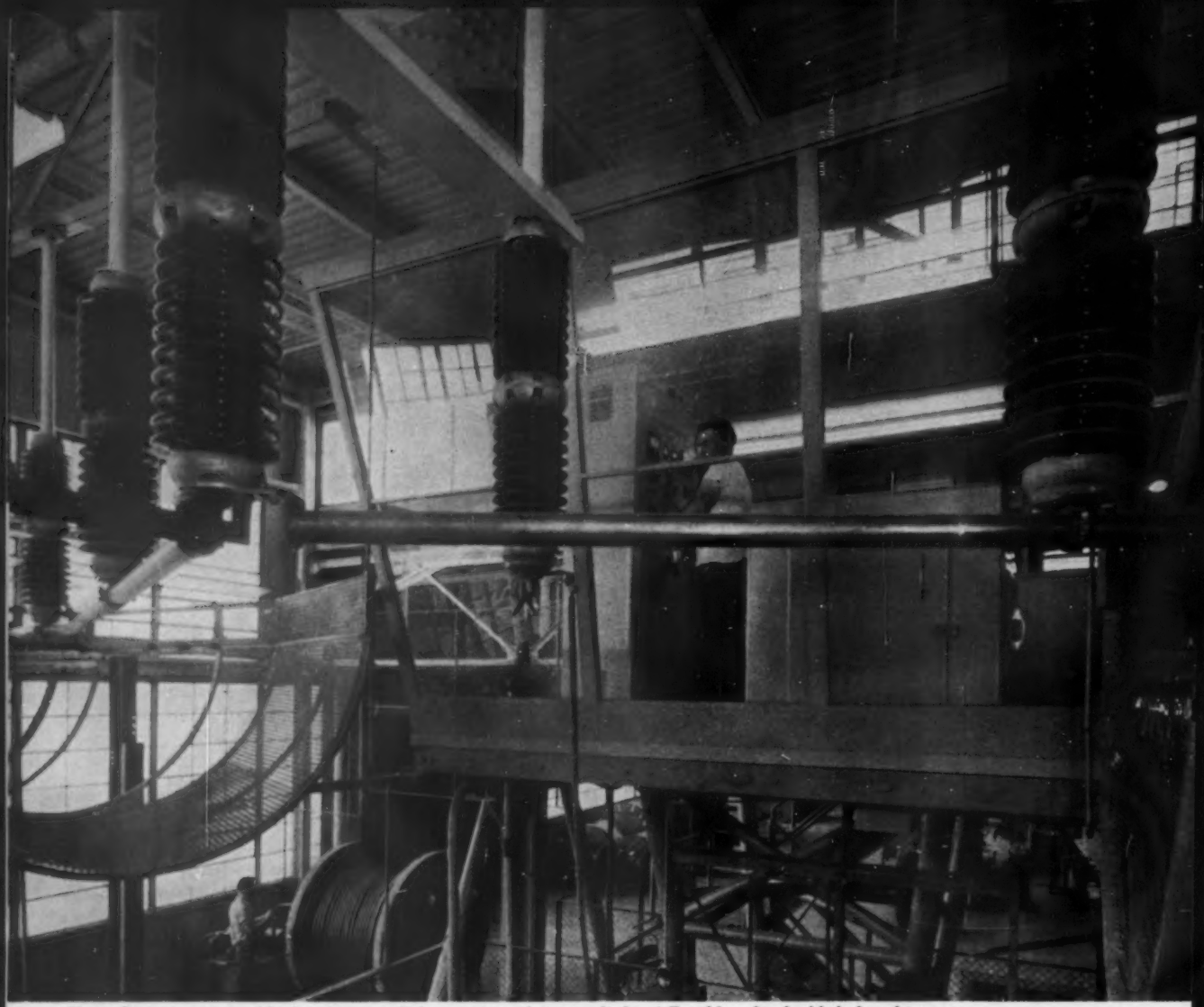
Insulation purity: For extra protection against contamination, the unvulcanized Anaconda Butyl is passed through a series of screens, one of which is so fine it will hold water.

Strand-shield taping: For better equalization of internal electrical stress, Anaconda applies a special fine-mesh semiconducting tape under the insulation of all stranded high-voltage cables.

Vulcanizing in lead: Conventional lead presses must stop periodically for refilling—severely heating up and often damaging the cable section in the die block, so Anaconda extrudes lead continuously. In the next step, exceptionally large drums are used for vulcanizing in lead to eliminate distortion of jackets and insulation.

These few examples help show you that the manufacture of Anaconda Butyl (AB) is highly specialized, highly precise—and why Anaconda offers you the big advantage of consistent high quality.

Huge reel entering large vulcanizing tank which vulcanizes cable quicker than conventional methods, eliminating distortion of insulation.



Shown here is a section of final testing area. Voltage tests are being applied to *full reel lengths* of cable before shipment.

ANOTHER BIG REASON WHY YOU SHOULD CONSIDER ANACONDA BUTYL (AB) CABLE—

SPECIALIZED QUALITY CONTROL AND INSPECTION

From the start: Raw-material suppliers are required to submit certified test reports. Then, tests and sampling at our plant offer extra protection even before production begins. **To finish:** Here's the final inspection line where the finishing touches are applied and where every inch of cable is carefully inspected. Perhaps you already know that Anaconda test procedures are much above industry standards. But do you know that test voltages on Anaconda Butyl (AB) Cable are 125% of industry standards—that minimum corona level is 150% of rated voltage to ground?

Quality control at Anaconda is *more* than mere testing and inspection. It is built into every manufacturing step. That's why you can be sure your Anaconda cable will be of high quality—why you can be sure Anaconda Butyl (AB) Cable is the finest rubber-insulated cable you can buy.

Everything you need to know about Anaconda Butyl (AB) high-voltage cable is neatly summed up in a new booklet, DM-5903, "Anaconda High-Voltage Durasheath* Cable." For your copy, write to: Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y. *Reg. U.S. Pat. Off. 59256 Rev.

ASK THE MAN FROM

ANACONDA®

ABOUT BUTYL (AB) HIGH-VOLTAGE CABLE

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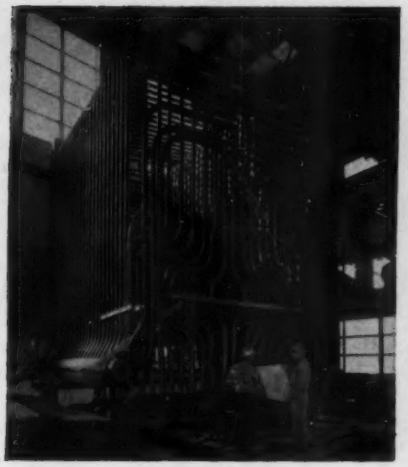

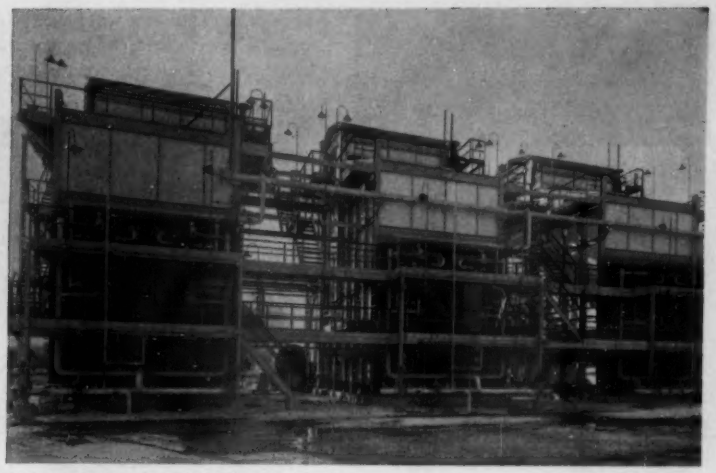

AT LEFT: Installing a 60,000 lbs/hr unit in a brewery

ABOVE: A battery of 125,000 lbs/hr units in a chemical plant

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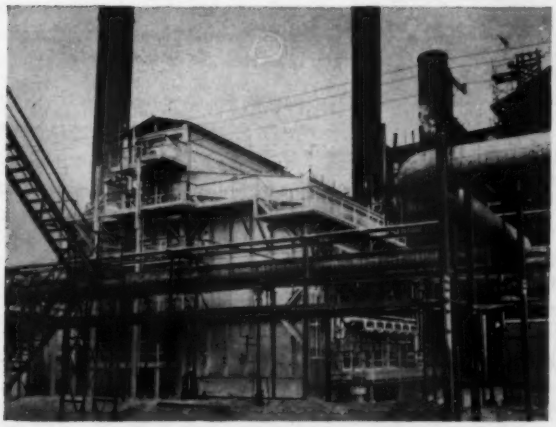
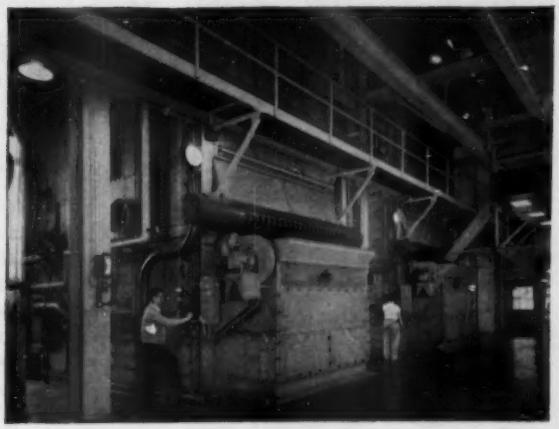


This 400,000 lbs/hr unit is installed in a leading petroleum refinery



Three 40,000 lbs/hr units serve a medical center

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HELPFUL WATER CONDITIONING DATA FROM BETZ

RETURN LINE CORROSION

Causes of corrosion can be readily identified and economically corrected.

Corrosion in the condensate return lines of boiler systems is a frequent problem. To properly prescribe a solution to the difficulty, it is necessary to determine the primary cause of the attack. Prompt elimination of serious return line corrosion is certainly most advisable since necessary maintenance and replacement of pipe and fittings can be quite costly.

By far the most common causes for return line corrosion are the presence of either oxygen or carbon dioxide, or both of these gases dissolved in the condensate. The appearance of the corroded sections will be a good indication of the cause. An attack by carbon dioxide will be characterized by an actual thinning of the metal wall of the pipe, with associated grooving of the metal. Such attack is illustrated in Figure 1.

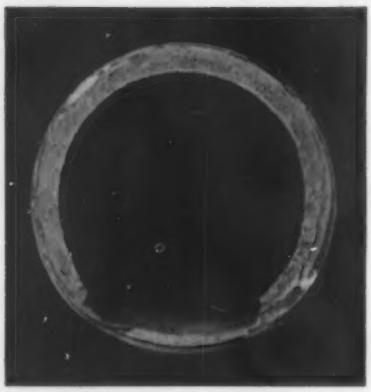

Figure 1—Grooving attack by CO_2 is shown in this end view of the condensate pipe.

Corrosion by dissolved oxygen will be evident by a series of pits, usually accompanied by deposits of the reddish colored iron oxides. Such attack may be observed in Figure 2. It is not uncommon to see the results of attack which is due to both oxygen and carbon dioxide. The appearance of such sections will have the combined characteristics of oxygen pitting and carbon dioxide corrosion grooving.

Figure 2—Oxygen pitting attack, distinctly different from CO_2.

Oxygen Attack

Oxygen in steam and condensate may originate directly from the boiler feedwater or may enter at various points in the condensate system. Boiler water makeup will contain appreciable quantities of dissolved oxygen, especially if taken from a surface supply. Since the solubility of dissolved oxygen decreases with increasing temperature, when the feedwater undergoes an increase in temperature in the boiler itself, the dissolved oxygen will be liberated and passed over with the steam. This fact makes the use of an open or deaerating heater of utmost importance in good engineering design of a boiler plant. With such an installation, the major portion of the oxygen in the water will be removed before the water enters the boiler.

The use of an open or deaerating heater removes the oxygen by mechanical deaeration of the boiler feedwater. Since mechanical deaeration is not successful in removing 100% of the dissolved oxygen present, the feed of a chemical deaerant is economically justified to assure that the last traces of the dissolved oxygen are removed. Ordinarily, sodium sulfite (Na_2SO_3) is used for this purpose.

Recently, hydrazine (N_2H_4) has been applied to achieve oxygen removal. The use of hydrazine is usually confined to high pressure installations where the concentration of dissolved solids is critical. Unlike sodium sulfite, hydrazine does not increase the solids of the boiler water.

Oxygen attack can take place not only due to inefficient deaeration of the feedwater, but also through the possibility of oxygen leakage into the condensate. Air infiltration can be expected at condensate pumps, or other points in the system where air may come in contact with the condensate. This potential difficulty can be checked by conducting dissolved oxygen tests on the condensate itself. If it is determined that oxygen is present in the condensate, appropriate mechanical steps can be taken to eliminate or minimize oxygen infiltration.

Carbon Dioxide Attack

Carbon dioxide is the most prevalent cause of return line corrosion, and its source is primarily the feedwater. An open or deaerating heater will remove any free carbon dioxide from the feedwater, but such removal will not eliminate the presence of carbon dioxide in the steam. Since bicarbonates and carbonates present in boiler feedwater will undergo decomposition at elevated temperatures to form carbon dioxide, the result of this decomposition is the chief source of carbon dioxide in the steam. The reactions are as follows:

(1) $2NaHCO_3 + \text{heat} \rightarrow Na_2CO_3 + CO_2 + H_2O$

bicarbonate + heat → carbonate + carbon dioxide + water

(2) $Na_2CO_3 + H_2O + \text{heat} \rightarrow 2NaOH + CO_2$

carbonate + water + heat → hydroxide + carbon dioxide

While reaction (1) will proceed to 100% completion, the decomposition indicated in reaction (2) proceeds to only about 80% completion. All other things being equal, the higher the carbon dioxide content of the steam, the greater will be the corrosion potential. The severity of the anticipated attack may be roughly estimated by conducting

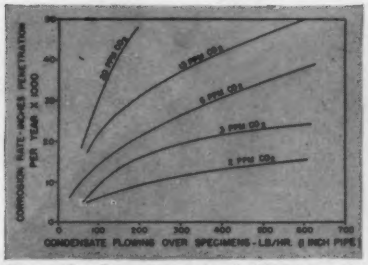

Figure 3—Corrosion rate of CO_2 depends on its concentration and flow rate. Note the drastic rate increase at concentrations above 6 ppm CO_2.

the phenolphthalein and methyl orange alkalinity determinations on the boiler feedwater. In some cases a carbon dioxide concentration as low as 6 ppm may cause a troublesome corrosion problem in the return piping.

However, in addition to the carbon dioxide concentration of the steam, there is one other important consideration in anticipating the severity of corrosion due to carbon dioxide. That consideration is the total pounds of carbon dioxide. Figure 3 clearly illustrates this point. It should be noted that with a carbon dioxide concentration of 6 ppm or above, the rate of corrosion increases rapidly as the rate of flow increases. Another factor which can materially influence the severity of carbon dioxide attack is the possibility of stratification. This leads to a higher rate of attack than expected for the particular flow rate and concentration of carbon dioxide.

Since the carbon dioxide contamination results from an actual breakdown of the carbonate and bicarbonate alkalinity of the feedwater, deaerating practices will be ineffective in reducing the corrosion potential due to this gas. Effective reduction of the corrosion potential may be achieved by external treatment of the feedwater or makeup water to reduce the bicarbonate alkalinity thereof. Such external treating facilities include lime-soda, and lime-gypsum softening, which ordinarily reduce the alkalinity to the 50-60 ppm range. It is advisable, from the standpoint of reducing carbon dioxide corrosion to maintain the softener effluent alkalinity in the carbon-hydrate form, rather than in the form of bicarbonate-carbonate. Other external methods that can be employed to reduce bicarbonate alkalinity to a very low level include acid feed, hydrogen zeolite softening, and dealkalization.

Neutralizing and Filming Amines

When external softening cannot produce a sufficiently low carbon dioxide concentration of the steam, or when the expense for such external treating facilities is not justified, excellent protection from attack can be achieved with the use of neutralizing amines or filming amines.

Neutralization of carbon dioxide can be safely accomplished by certain volatile amines. These amines, when fed to a boiler, volatilize with the steam and combine with the carbon dioxide to neutralize its acidity. Since they react directly with carbon dioxide, the quantity required is proportional to the carbon dioxide content of the steam. Where large amounts of carbon dioxide are present, costs can become excessive.

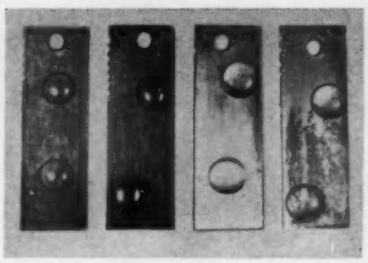

Figure 4—Non-wettability of amine film.

The filming amines function by laying a non-wettable film of monomolecular thickness over the metal surfaces, which is impervious to water. Since the film prevents the water from reaching the metal surface, attack is prevented. The quantity required is independent of the carbon dioxide concentration, and therefore is a more economical treatment particularly where high concentrations of this gas are present. The film forming amines are also effective when oxygen is present in moderate amounts. Figure 4 illustrates the water repellency of the amine film.

Summary

1. Oxygen and carbon dioxide are the chief causes of return line corrosion.
2. Attack by dissolved oxygen is characterized by pits and build-up of deposits of iron oxides.
3. Attack by carbon dioxide is characterized by grooving and actual thinning of the metal pipe walls.
4. Combined attack by oxygen and carbon dioxide will have the characteristics of each.
5. Oxygen attack can be stifled by efficient chemical and mechanical deaeration.
6. Carbon dioxide attack can be inhibited by external reduction of alkalinity and/or use of filming or neutralizing amines.

NEED NOT BE A PROBLEM

A number of factors must be considered on an *individual plant basis* to determine the best way to overcome a return line corrosion problem. Continuing research and development by BETZ LABORATORIES on this important subject has led to a better understanding of the effect of different variables, as well as provided increasingly effective control methods. A BETZ Field Engineer will be happy to discuss your return line corrosion problem and suggest result-producing ways to overcome it. Why not take steps to call him in *now* while you're thinking about it?

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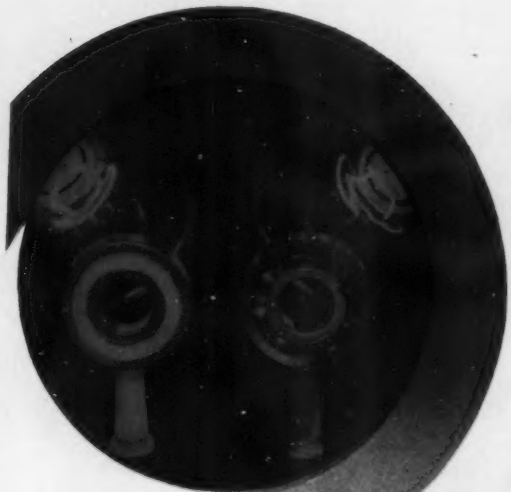
High-temperature bearings, such as those in this rotary furnace, last longer, require less maintenance with Mobilplex EP.

Mobilplex ep

The Multi-Service Grease with unique Calcium EP Complex. Never before in a single lubricant such a wide range of use . . . such a margin of superiority . . . such a potential for maintenance savings.

Below: Infra-red heat lamp causes ordinary grease to run out of bearing. Mobilplex EP in bearing at left is unaffected.



Outstanding heat resistance is one of the many important properties of Mobil's new Multi-Service grease—*Mobilplex EP*. In your manufacturing plant you'll find it protects bearings operating at temperatures in the range of 300 F. Mobilplex EP also offers extra protection against wear under heavy loads, water emulsions and corrosion. It is a singularly tenacious and adhesive lubricant.

This Multi-Service grease has outstanding oxidation resistance as well as excellent structural and storage stability. These qualities—plus the great versatility of Mobilplex EP—make it useful throughout the plant.

Plant operators throughout the country are finding Mobilplex EP extremely effective in extending bearing life and protecting production schedules. In addition, they're saving more than with ordinary multi-purpose greases because Mobilplex EP makes it possible to reduce application frequency, simplify storage and handling procedures.

Contact your Mobil representative for full details. He can show you results of laboratory performance tests of Mobilplex EP and five leading competitive extreme-pressure greases. You'll see why Mobilplex EP is rated tops!

MULTI-SERVICE ABILITY OF MOBILPLEX EP

ANTI-FRICTION BEARINGS. (*horizontal and vertical*). Temperatures in the range of 300 F. Heavy or shock loads. Water contamination. Speeds—low, normal, high.

PLAIN BEARINGS. All normal mechanical and operating conditions. Temperatures in the range of 300 F. Waterwash. Heavy or shock loads.

DISPENSING AND APPLICATION DEVICES
Transfer pumps. Hand and power guns (*long lines*). Central greasing systems.

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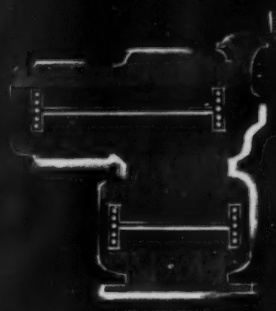
Field Versatility

Mounting feet, end brackets, control hand wheel, conduit box, and output shaft can be relocated in minutes without special tools for wall, floor or ceiling mounting. Components can be changed or controls can be added in the field to meet ever changing conditions of operation.

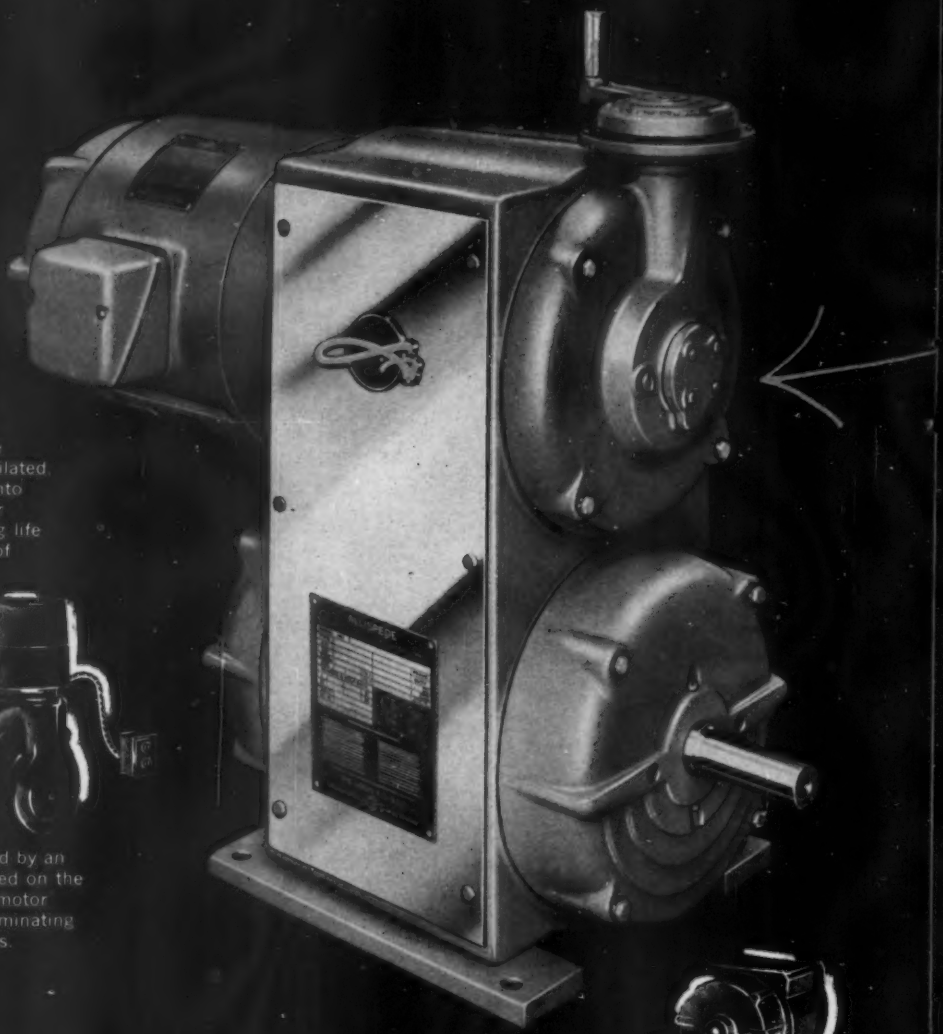


Four-Bearing Design

This important design feature eliminates the problems of overhung discs. It equalizes distribution of belt loading — keeps bearings, shafts, discs and belt permanently aligned — improves performance — and extends bearing life.

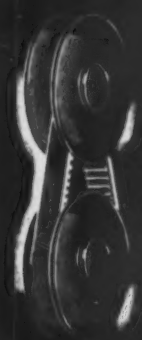
Dual-Ventilation System

The motor and the belt housing of the ALLISPEDE DRIVE are individually ventilated. Motor ventilating air is not exhausted into the belt housing — belts run cooler for longer life. Service factor and operating life of all components are higher because of lower operating temperatures.



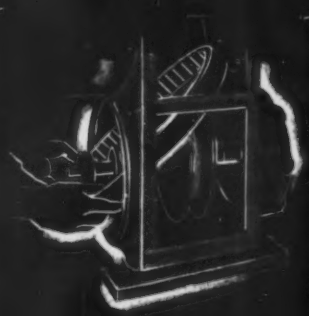
Trouble-Free Remote Control

Electrical remote control can be provided by an enclosed speed adjusting motor, mounted on the belt changing mechanism. This torque motor can be stalled without overheating, eliminating the need for troublesome limit switches.



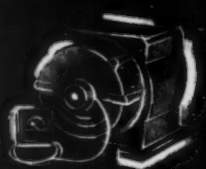
Long Belt Life

Single cog belts with extra contact area provide more efficient transmission of power and longer belt life. Dual ventilation, precision machined discs, equalized loading, and automatic belt tension aid in extending belt life.



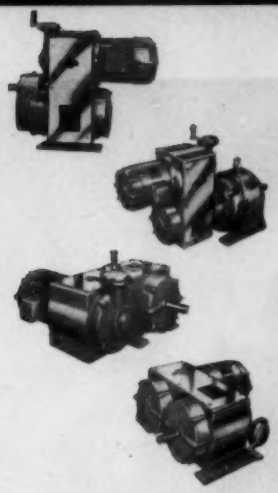
Fast Belt Changing

Belt changing is fast and easy — without requiring special tools. You remove only one bearing bracket and the speed-adjusting mechanism to make fast changes without affecting permanent alignment of discs or belts.



Remote Speed Indication

A tachometer generator mounted on the output shaft operates an indicator that can be mounted at a remote location. Disassembly of the tachometer is not required when making belt changes.



Four of the many variations of mounting available with the ALLISPEDE DRIVE.

Another new product from Louis Allis

Let's look at the features of the ALLISPEDE DRIVE*

New Louis Allis Drive offers accurate control – maximum belt life – long-run economy – low-cost versatility – ease of installation

After checking the many superior features of this drive, you will prefer the Allispede every time. The illustrations at the left demonstrate the many advantages of design and construction available in this drive.

The Allispede Drive gives you high efficiency and close regulation. Belt tension adjusts automatically — and belt changes are easy and fast. The modern design eliminates overhung discs—maintains belt and disc alignment — results in longer belt life — provides the ultimate in field versatility.

Check the accompanying features — *now!* A phone call to your local Louis Allis District Office will bring a skilled Louis Allis Field Engineer. He will gladly study your drive problem and offer Application Engineering assistance. Or write to Louis Allis Company, 434 East Stewart Street, Milwaukee 1, Wisconsin for a copy of Bulletin 3600.

*ALLISPEDE is a trademark of The Louis Allis Company.

The Complete Line–

Whatever your mechanical drive application requirements, there's an ALLISPEDE DRIVE to match it exactly. Sizes up to 30 HP, output speeds from 1 to 10,000 RPM, and speed ranges up to 8:1. Motors can be open, drip-proof, enclosed, or explosion-proof; with ventilated or enclosed belt housings, suitable for foot, P-base, C- or D-flange mounting on your machine. Available with parallel shaft, or right-angle, integral gear reducers, special shaft extensions, integral magnetic brakes, electrical or mechanical remote control, and other modifications as required to meet the specifications of your application.

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LOUIS ALLIS

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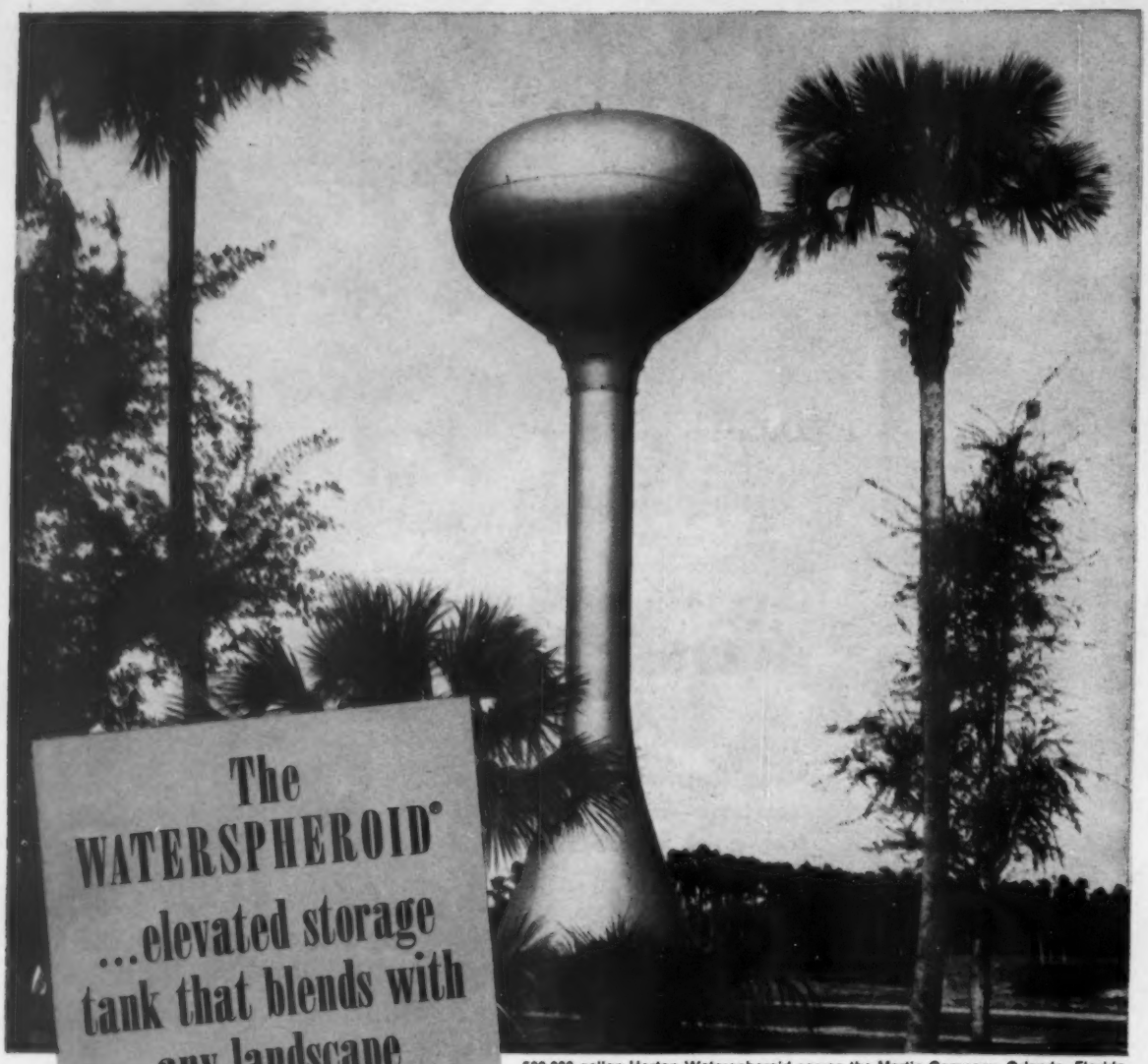

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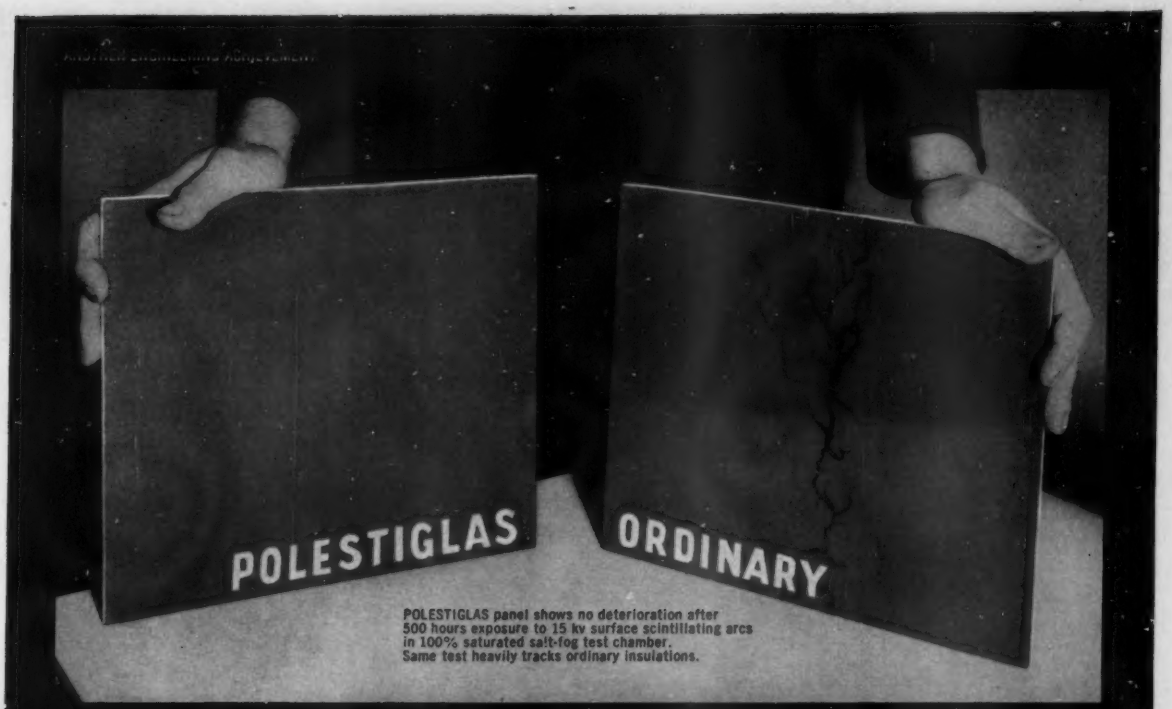

POLESTIGLAS panel shows no deterioration after 500 hours exposure to 15 kv surface scintillating arcs in 100% saturated salt-fog test chamber. Same test heavily tracks ordinary insulations.

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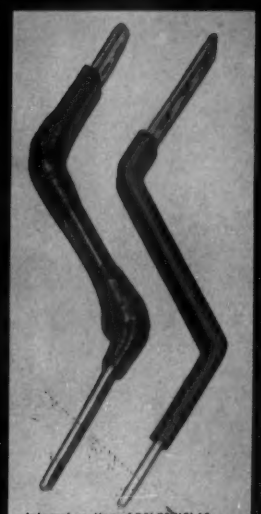

Integral casting of POLESTIGLAS (right) assures uniform bus insulation and eliminates hand-wrapped bends and offsets. Insulation is bonded to the bus bar to give void-free construction resulting in low corona loss.

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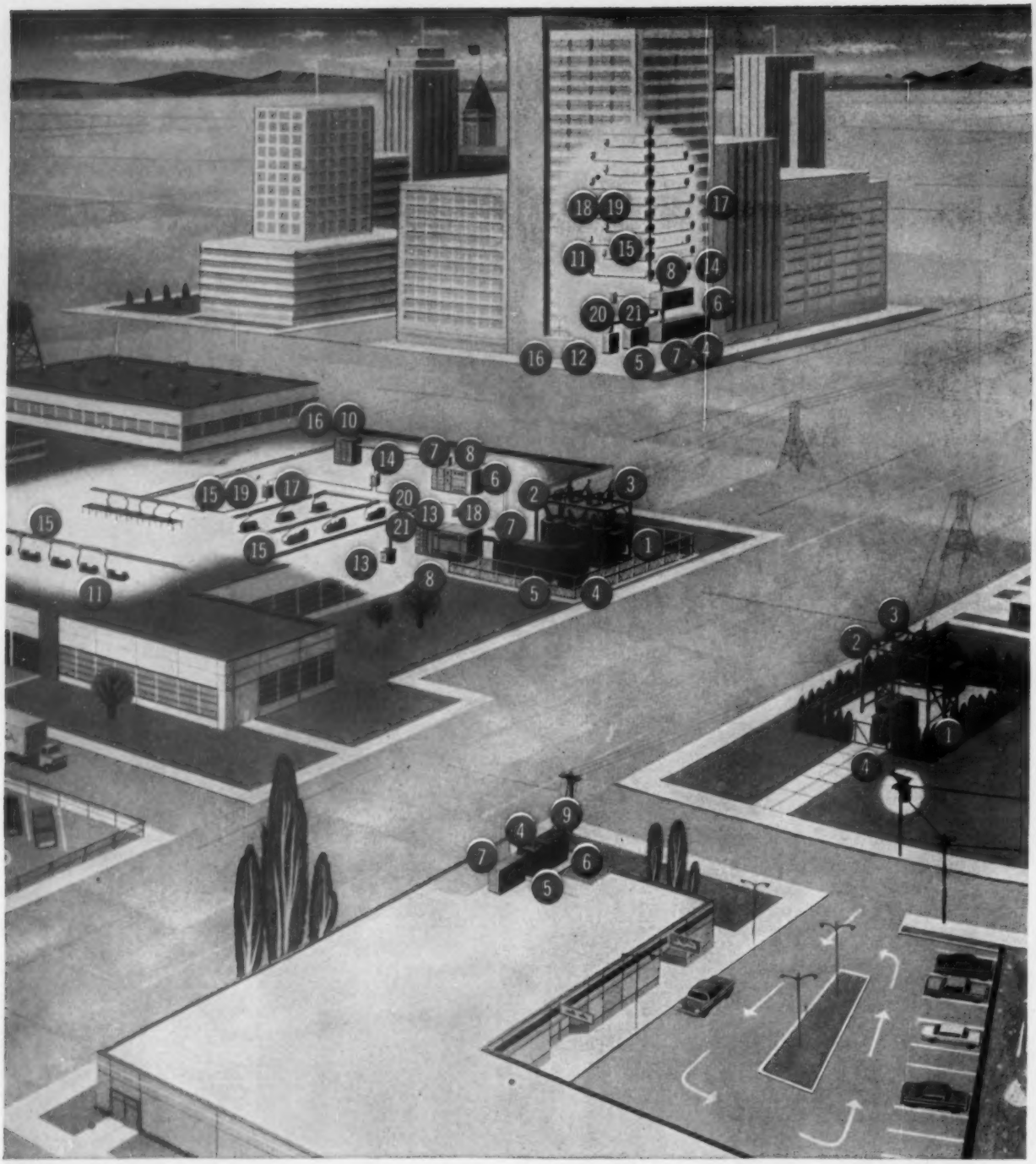

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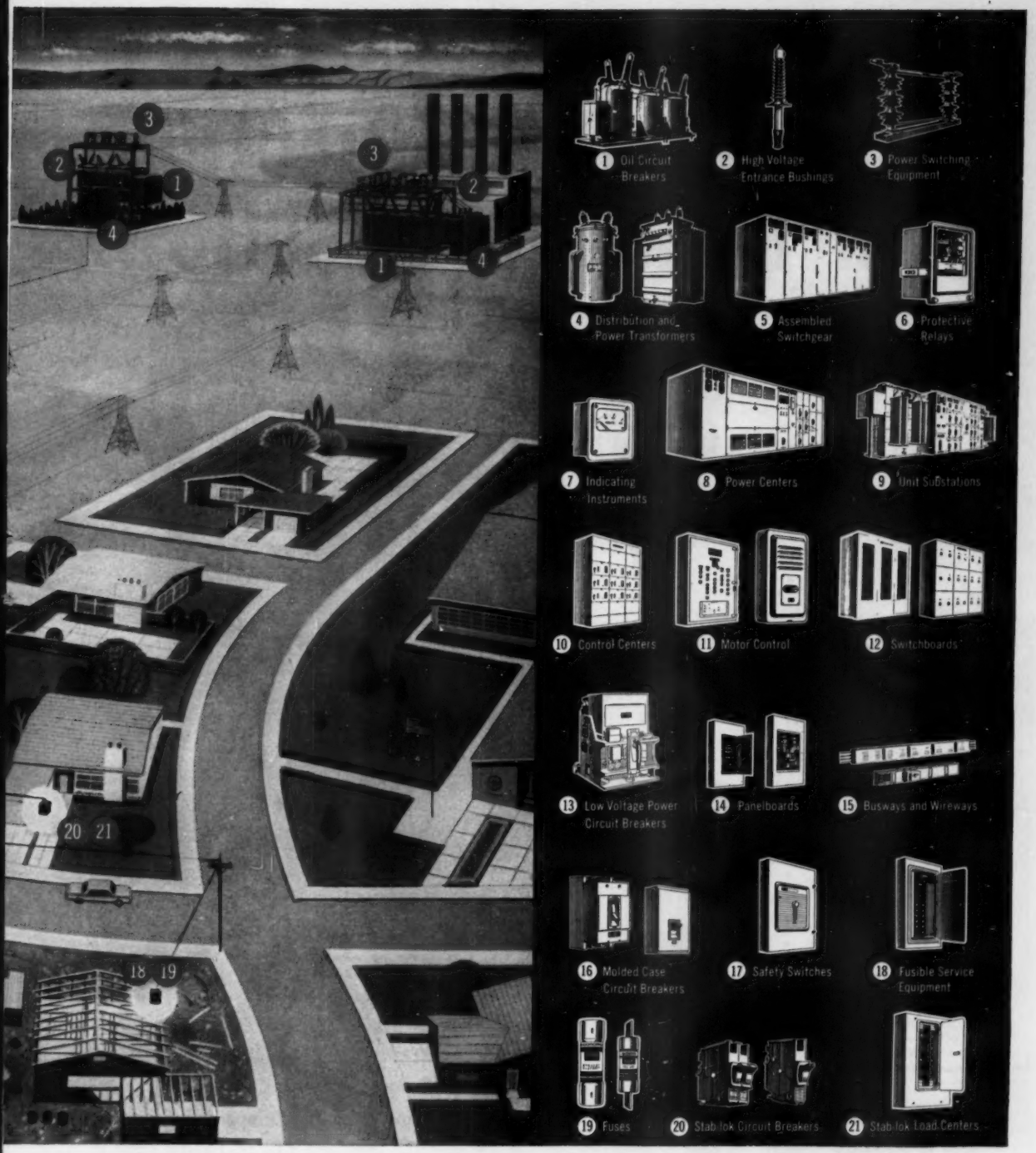

distribution and control equipment

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Effective filtration is essential for optimum performance in hydraulic circuits. To keep a system clean and functioning properly, it is important that the filter be designed specifically to meet the requirements of the job.

Purolator's complete line of filters for hydraulic systems includes models for every set of operating conditions likely to be encountered. A few are shown here; there are many more standard models from which to choose. If your application requires a special filter, Purolator will design and build it. Let Purolator work on your toughest filtration problem.

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BULLETINS just released and of immediate plant interest

INSULATION

101 Insulating Panels—This 28-pp manual contains application information and design data on Asbestone Panels for interior and exterior construction. Includes general information on construction and characteristics of panels, design data, sizes, erection of partitions, and specification data, and is profusely illustrated with drawings and diagrams showing details. National Gypsum Co.

102 Industrial Insulations—Industrial insulations and insulating cements for power, chemical, petroleum, petro-chemical and manufacturing industries are described in Form 6451. Selection guide indicates applications for high temperature and superheated surfaces; high, medium and low pressure steam lines; cold water pipes; heating and air-conditioning ducts; and breechings. The Philip Carey Mfg. Co.

103 Insulation Specifications—This 50-pp manual of specifications, IN-128A, is designed for power, chemical and petroleum industries. It is divided into five sections—insulations for temperatures above 100 F, insulations for temperatures below 100 F, tank insulation, sphere and spheroid insulation, regenerator, catalytic reactor and oil heater lining and insulation. Tables include recommended thicknesses for both steam generating plants and process equipment based on average economic conditions for the industries and recommended thicknesses of insulation to prevent sweating. Johns-Manville.

104 Underground Insulation—Three customized systems of underground pipe insulation are described in this bulletin: a cased thermal concrete, insulating concrete conduit, and a water resistant monolithic conduit. Gives features of each and lists additional qualities common to all. Concrete Thermal Casings, Inc.

CONSTRUCTION

105 Non-Shrink Mortar—How to achieve better results in 12 important construction operations by using non-shrink mortar is hightlighted in Bulletin E-38. Operations are illustrated in a building cross section view, and each application illustrated is keyed to detailed data on use of non-shrink mortar for the particular application. The Master Builders Co.

106 Industrial Flooring—Three case histories detailing solutions to severe flooring problems created by heavy equipment are presented in 12-pp Case History 591. Before-and-after photos tell the story. Walter Maguire Co., Inc.

107 Floor Styling—This 16-pp booklet gives information on using color and design effectively in floors, and covers advantages of the vinyl asbestos tile. Color charts show range of colors and stylings available, and typical floor designs are pictured. Azrock Floor Products Div., Uvalde Rock Asphalt Co.

MATERIALS HANDLING

108 Conveyors For Industry—Two types of conveyors—a conventional trolley system pulled by a continuous cable and a chainless conveyor—are featured in 16-pp Catalog CD-B. Advantages are detailed and typical installations illustrated. The American MonoRail Co.

109 Sectional Belt Conveyors—Book 2779 is a 40-pp practical handbook on the use and selection of standardized sectional belt conveyors. Lists components and accessories and includes detailed engineering and selection data, as well as illustrations showing applications in a variety of industries, and drawings of typical layouts. Link-Belt Co.

110 Pneumatic Conveying—The role of pneumatic conveying equipment in the pulp and paper industry is discussed in 16-pp Bulletin FF-26-2. Descriptions cover the handling of salt cake, wood chips, lime, soda ash, pulpknot rejects, and various clays. Photos, drawings, and specification tables are included. Fuller Co.

111 What Makes a Fork Lift—Design features and operating advantages of company's Stream-Liner Series of fork lift trucks are illustrated and described in 24-pp Bulletin SP-10. Photos, drawings and cutaway views illustrate various components of the lift trucks which feature an all-steel, arc-welded frame for maximum loads. Towmotor Corp.

112 Modern Fork Lifts—Engineering, styling and operating features embodied in the Pace-Maker Series of fork lift trucks are illustrated and described in 24-pp Bulletin SP-23. Advantages of construction and design are detailed, and component features are illustrated with numerous photos. Towmotor Corp.

113 Advance Design Trucks—Bulletin BU-451A is a 16-pp pictorial review of company's FT Series fork lift trucks. Illustrations, including cutaways, describe engineering, design, construction and operating features. Allis-Chalmers Mfg. Co.

114 Jib Cranes—Bulletin 405-A illustrates and describes square column jib cranes with capacities from 3 to 15 tons. Specification data and diagrams showing details and two types of mountings available are included. R. G. LeTourneau, Inc.

115 Flexible Bins—Features and advantages of company's flexible bin system designed for a variety of parts and storage needs are illustrated and described in this 16-pp bulletin. Dimensional data and specifications are included, as well as photos of typical installations. Borroughs Mfg. Co.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

116 Heavy-Duty Saws—This illustrated bulletin describes heavy-duty electric saws available in three sizes from 6½ to 8¼ in. diam. Shows design and performance advantages of these saws and includes both specifications and comparison data covering these and competitive makes. Optional equipment is also shown. Milwaukee Electric Tool Corp.

117 Welding Equipment—Illustrated and described in 24-pp Bulletin EW-209 is a line of welding equipment. Covers gasoline and diesel engine driven welders, engine driven welder-power combination units, electric motor driven arc welders, rectifier type welders, transformer type welders, combination transformer-rectifier type welders, a-c and d-c inert-gas-shielded arc welders and automatic and semi-automatic welding equipment, induction heating equipment. Hobart Brothers Co.

118 Which Welding Power Source?—This 8-pp article offers a comprehensive guide to proper selection of arc welders for use with stick electrode, gas shielded tungsten-arc or gas-shielded metal-arc welding processes. Illustrated with schematic drawings, it details eight specific steps to be taken into account when choosing one of four basic types of power sources. Air Reduction Sales Co., Div., Air Reduction Co., Inc.

On pages 287-288 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

119 Automatic Soldering Guide—This 8-pp bulletin includes data on the range of preform shapes, the alloys from which they are made and their use in automated production processes. Also describes heating methods, flux selections, metals characteristics and alloy selection, and contains temperature conversion chart as well as tin-lead fusion diagram, charts describing physical properties and melting points, other data. Alloys Unlimited, Inc.

INSTRUMENTS, CONTROLS

121 Automation Systems—Bulletin 3019 describes systems for full-scale automatic control in plants, refineries and pipelines. Photos and drawings of this control system are included. Consolidated Systems Corp.

BULLETINS

(Begins on page 23)

122 Transmitting Instrument—Descriptive information on company's Master Controller, an automatic sensing and transmitting instrument that controls pressure or temperature by proportioning of process or combustion rate to load demand, is given in Catalog CMC-687. Specification, description of components, application data, installation and adjusting instruction. Cleveland Controls, Inc.

123 For Small Flows—Bulletin 18P describes company's Purge Rotameters for measuring and controlling fluids flowing at low rates. Exploded drawing shows components and design of basic rotameters, and sectional drawings, dimensional and capacities. Schutte and Koerting Co.

124 Radiation Detectors—Presented in 30-pp Catalog C93-1a is a description of the theory and fundamentals of radiation pyrometry as well as the function, construction, and application of Radiamatic pyrometers. A section on how to choose the proper radiation detector is included, and instruments for use with this type of temperature sensing element are described. Minneapolis-Honeywell Regulator Co.

125 Geared Counter — This data sheet and application guide describes operation, uses and modifications available on a line of high speed, quick reset geared counters. Specifications included. Veeder-Root Inc.

126 Door Controls—Illustrated and described in 16-pp Bulletin M-14 are door controls designed to solve a variety of traffic problems, as well as problems of air temperature and humidity control. Diagrams showing details of design and operation are included, as well as dimensional data, applications. The Stanley Works.

127 Performance Meter—Bulletin K15A illustrates and describes a direct-reading performance meter for diesel, gasoline, natural gas, and steam engines. Construction and principle of operation are detailed and internal works are shown on cutaway. The Korfund Co., Inc.

128 For Water Treatment—Offered in 30-pp Booklet D97-2 is a compilation of article reprints on instrumentation for treatment of water and sewage. What instruments water and sewage plants use, how they are used, and their function in controlling automatically the many variables in treatment processes are covered. Minneapolis-Honeywell Regulator Co.

DUST, FUME CONTROL

129 Wet-Type Collector—Described in this 6-pp bulletin is the Hydro-Filter, a wet-type dust collector for collection of dust fumes. Includes dimensions, specifications and capacity data for four models, capacities from 1000 to 40,000 cfm. Operation, application and advantages of the Hydro-Filter are covered. National Dust Collector Corp.

130 Gas Scrubbers—Generously illustrated Bulletin 203-C, 8 pp, presents high-efficiensy direct-contact gas scrubbers for removal of particulate matter, including sub-micron dust and fume, and absorption of gases and vapors, capacities to 250,000 cfm. Operational principles are explained, and descriptions of typical applications are illustrated. Peabody Engineering Corp.

PUMPS AND COMPRESSORS

131 Rotary Pumps—Features and advantages of company's Series D internal gear rotary pumps designed for transferring a broad group of liquids in a wide viscosity range are detailed in this product bulletin. Construction and performance data are given, as well as dimensional data and diagrams. The Wayne Pump Co.

132 Vertical Turbine Pumps—Featured in this product bulletin is a line of vertical turbine pumps job-engineered to suit specific applications in industry. Design and construction details are noted, and applications listed. Fiese & Firstenberger Mfg., Inc.

133 Standardized Vertical Pump—This folder describes the high measure of pump standardization achieved with the Veriflow pump, a vertical single stage unit covering the range of 1- to 4-in. pumps for petroleum, chemical and general industrial use. Time-saving installing, economy are stressed, and design features cited. United Centrifugal Pumps.

134 Air Compressors — Stationary air compressors for continuous, heavy duty service in industry are illustrated and described in Bulletin A-62. Contains specifications, diagrams, cross section drawings, installation photos and other data. Joy Mfg. Co.

135 Compressed Air Fundamentals—Sixteen-pp Form 1548 is intended to aid in selection of a small, "packaged" air compressor. Discusses compressed air, how it is compressed, single- and two-stage compressors, piston displacement, control used, etc. Includes information on compressor oils, pipe sizes, wire sizes, terminology. Also provided is data on cubic feet of air required to operate a variety of pneumatic equipment, air supply tables, cylinder diameter requirements, chart on ratios of compression. Ingersoll-Rand Co.

ELECTRICAL

136 Vertical Motors—Featured in 16-pp Bulletin 219 is information on design and application of vertical squirrel cage induction, synchronous and wound rotor motors, 150 hp and up, frames 584 and larger. Bearing selection chart, comparative costs of motor type, specifications and normal torques are included, as well as cutaways showing construction and ventilation features. The Ideal Electric & Mfg. Co.

137 Reversing Capacitor Motor—Described in 8-pp Specification S 1016-2 are reversing capacitor type motors, with integral strain release and stroke adjustment. Includes detailed specifications, dimensional data and diagrams. Minneapolis-Honeywell Regulator Co.

138 For Low Voltage Generators—Practical tips on brush operation and maintenance on high-current, low-voltage generators used in electrolytic processes are given in 16-pp Bulletin CP-3004. Included is discussion of metal-graphite brushes used in plating generators, together with explanations of contact drop, friction, resistivity, and commutator surfacing, and section on facing-in of new brushes, dust removal, selective action, and factors affecting brush life. National Carbon Co., Div., Union Carbide Corp.

139 Motor Control Centers—Design features of company's Uni-Bus motor control centers are stressed in 24-pp Bulletin UM-100. Safety advantages, as compared to conventional equipment, are detailed in text and illustration. Specifications and dimensions are presented, also wiring diagram. Electric Distribution Products, Inc.

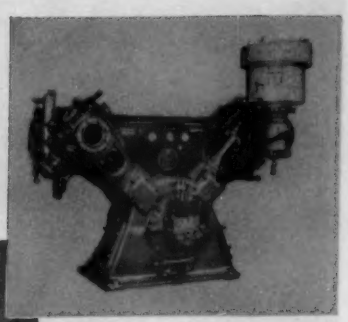
Reader Service Cards for ordering bulletins are on pages 287-288. Be sure to include your name, job title, and company, even if you want bulletins mailed to your home address.

140 Distribution Switchboards—Bulletin 2015, 6 pp, describes shallow-depth switchboards through 2000 amp. Designed to aid in centralizing power distribution, it shows how eight basic sections can be combined to meet individual switchboard applications. Three types are covered: incoming line section, distribution sections and combination metering and distribution sections. Each section is described and illustrated with photos and cutaways. General and construction features are covered. Federal Pacific Electric Co.

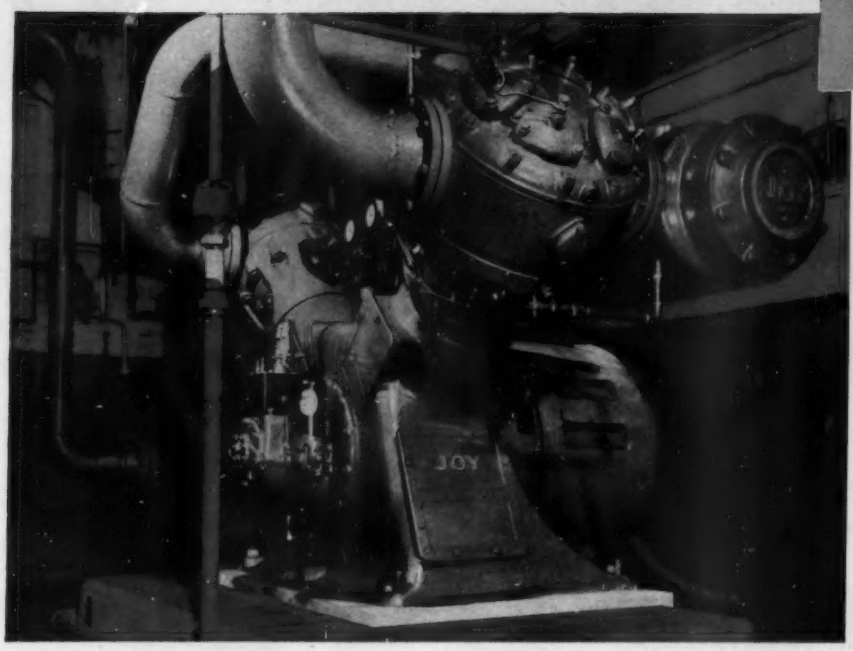
141 Circuit Breakers—General purpose d-c circuit breakers—Type FB high-speed current-limiting units—are described in Bulletin S-4601-1A. Illustrates and describes design features, performance, applications, and gives ratings, dimensions and weights. I-T-E Circuit Breaker Co.

142 Individually Enclosed Breakers—Featured in 8-pp Bulletin 4261-2B are individually enclosed low-voltage power circuit breakers featuring visible break disconnect contacts. Selection chart, application data, and coil ratings are given. I-T-E Circuit Breaker Co.

(More Bulletins on page 289)



Compact design means simple installation. Set up on a simple block foundation, bolt down and connect air and water lines.



the COMPACT compressor with big compressor features... Joy WN-112

Only the package designed WN-112 has such heavy-duty features as replaceable cylinder liners and crosshead guides. These liners are made of special alloys which make possible fine machining and mirror-like polishing. The crosshead has no wedges, set screws or shims—never requires adjustment. The main bearings never need adjustment either because they are anti-friction, heavy duty ball, or spherical roller type. These, and other big compressor features add up to trouble-free performance that has made friends of literally thousands of plant and power engineers throughout industry.

When you are expanding your operations and require more compressed air, make sure you have details and complete information on the WN-112, one of a complete line of compressors for industry. You can then select any one of 24 standard models of the WN-112 plus special models for high and low pressures as well as oil-free operation. Capacities from 480 to 1072 cfm. Write for bulletin 606-15.

240-606

AIR MOVING EQUIPMENT FOR ALL INDUSTRY

JOY

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

For more facts circle 516 on Reply Card

Meet your need for CHEMICAL RESISTANCE with hose of Du Pont TFE resins

Hoses lined with TEFLON are used here to handle chemicals and solvents in compounding cosmetics, colognes, room deodorants and insecticides. "Waxy" surface of TEFLON prevents holdup, absorbs no odors, and permits easy cleaning for service changes without contamination.

Completely inert to virtually all acids and solvents, hose lined with a TEFLON TFE-fluorocarbon resin can help you cut downtime and maintenance losses. Hose lined with TEFLON easily handles live steam and superheated water—TEFLON is rated for continuous use up to 500°F. Additional assurance of durability is provided by the excellent flex life of this hose, including high resistance to torque stress and vibration. And, with proper overbraiding, service pressures up to 6,000 psi are being used.

Hose lined with a TFE resin also offers maintenance engineers the cost-saving advantages of re-usability and interchangeability, because the "waxy" inner surface is easily cleaned, non-adhesive and non-contaminating. And now, new constructions especially for industrial applications include fiber reinforcements, elastomeric coverings, convoluted tubing for greater flexibility, and a variety of industrial couplings.

Ask your supplier, or write to: E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Department, Room T-3310, Du Pont Bldg., Wilmington 98, Del.
In Canada: Du Pont of Canada Limited, P.O. Box 660, Montreal, Quebec.

TEFLON is Du Pont's registered trademark for its fluorocarbon resins, including the TFE (tetrafluoroethylene) resins discussed herein.

DU PONT REG. U.S. PAT. OFF. **TEFLON®**

TFE-FLUOROCARBON RESINS

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

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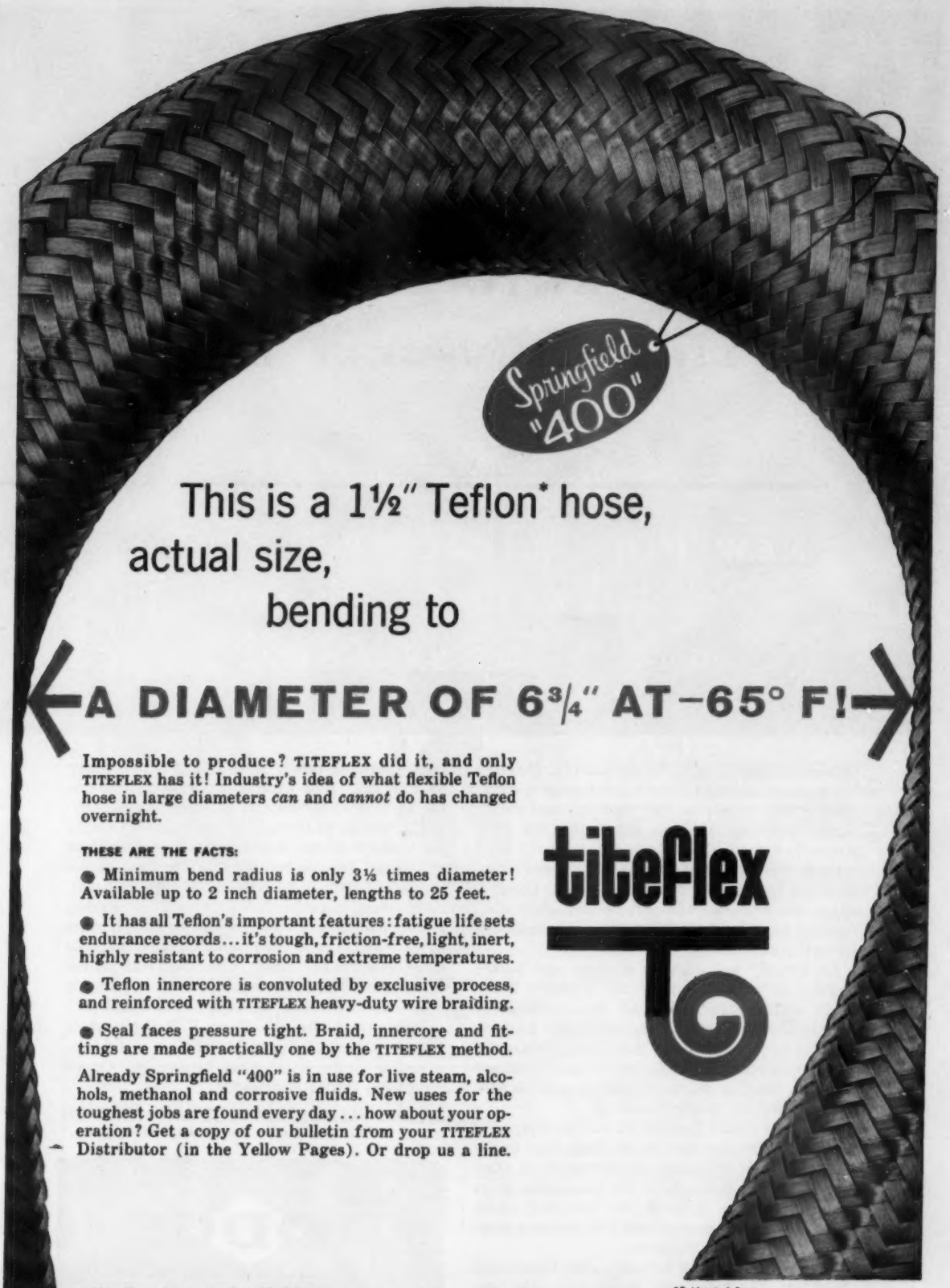

This is a 1½" Teflon* hose, actual size, bending to

A DIAMETER OF 6¾" AT −65° F!

Impossible to produce? TITEFLEX did it, and only TITEFLEX has it! Industry's idea of what flexible Teflon hose in large diameters *can* and *cannot* do has changed overnight.

THESE ARE THE FACTS:

- Minimum bend radius is only 3½ times diameter! Available up to 2 inch diameter, lengths to 25 feet.
- It has all Teflon's important features: fatigue life sets endurance records... it's tough, friction-free, light, inert, highly resistant to corrosion and extreme temperatures.
- Teflon innercore is convoluted by exclusive process, and reinforced with TITEFLEX heavy-duty wire braiding.
- Seal faces pressure tight. Braid, innercore and fittings are made practically one by the TITEFLEX method.

Already Springfield "400" is in use for live steam, alcohols, methanol and corrosive fluids. New uses for the toughest jobs are found every day... how about your operation? Get a copy of our bulletin from your TITEFLEX Distributor (in the Yellow Pages). Or drop us a line.

titeflex

titeflex inc. springfield mass. PACIFIC DIVISION • SANTA MONICA • CALIFORNIA

*T.M. of duPont
**T.M. of Titeflex, Inc., Pat. Pend.

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Announcing

—AN ENTIRELY NEW LINE OF V-BELT DRIVES

NEW HIGH CAPACITY!
NEW SMALL SIZE!
MANY NEW SAVINGS!

Dyna-V is entirely new. In every detail, Dyna-V has been engineered to take advantage of today's great improvements in belt materials and metal alloys—resulting in V-belt drives that are sensationally compact.

Dyna-V is capable of handling up to three times as much horsepower in a given space. Dyna-V opens vast new possibilities for better, more economical machine design. And, in most instances *Dyna-V costs less!*

An entirely new high in strength and horsepower capability is packed into Dyna-V Belts. Cross section dimensions are substantially reduced—top width is much narrower. Dyna-V Sheaves are designed for these belts. Narrower grooves reduce face width—and weight. Costs are lowered. Smaller diameter sheaves and shorter center distances multiply savings.

Increased sheave strength for increased capacity is obtained through changes in design that utilize the full benefit of modern improvements in alloy metals. Dodge is noted for the superiority of its semisteel castings, to which now have been added ductile iron castings produced with the most modern electric furnace facilities.

Dyna-V Sheaves are equipped with Taper-Lock Bushings. The superiority of this mounting, patented by Dodge, is widely recognized. Taper-Lock's holding power is terriffic, yet it is "easy on, easy off." And Taper-Lock Bushings provide the additional advantage of interchangeability.

The benefits of Dyna-V go beyond compactness and initial low cost. Smaller sheaves reduce shaft overhang—increase bearing life. The dimensional stability of Dyna-V Belts (which are heat resistant, oil resistant, static conducting) solves the problem of belt matching. Every belt carries its full share of the load. The crowned top of Dyna-V Belts is a new concept in belt design. Combined with proved concave sidewall construction, it insures perfectly even load distribution between belt and sheave.

Write to us for the Dyna-V Bulletin which includes complete description of these new drives, selection tables, horsepower ratings, etc. Or see your local Dodge Distributor.

DODGE MANUFACTURING CORPORATION
2700 Union Street, Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

DODGE

Dyna V

Dyna-V Drives for capacities up to 50 hp use the new "3V" belt cross section and Dyna-V Sheaves to match. Dyna-V Drives for capacities up to 200 hp use the new "5V" belts and sheaves. Both sizes available from Dodge distributors' stocks. Larger sizes up to 1500 hp with "8V" belts and sheaves can be furnished on order.

Dodge continues to manufacture the conventional Taper-Lock Sheaves using industry's standard A, B, C, D and E cross section belts, the hp ratings of which have been increased an average of 40% without any increase in cost.

COMPARISON, ILLUSTRATED ABOVE — 3 HP, 1750 RPM, 2.41 TO 1 RATIO

	BELTS		SHEAVES			CENTER DIS-TANCE	HP	WEIGHT (LBS.)	COST	
	Number	Size	O.D. Driver	O.D. Driven	Width				Per hp	Per Drive
CONVENTIONAL TAPER-LOCK DRIVE	3	A42	4.15"	8.95"	2½"	12.3"	4.62	24.7	$5.62	$25.98
DYNA-V TAPER-LOCK DRIVE	2	3V400	3.35"	8.00"	1⅜"	10.8"	5.0	18.0	$4.50	$22.50
% SAVING *Savings vary with different sized drives*			19%	10%	56%	12%	+	27%	19.9%	13.4%

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

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Lubriplate No. 630-2 is a high temperature, extreme pressure, water-repellent, grease type lubricant. Ideal for the general lubrication of Industrial, Automotive, Construction, Farm and Marine Equipment. Lubriplate Grease Gun Cartridges provide an easy, quick, economical means of application. Prevent the waste and mess of hand filling. Packed 10 Cartridges in a handy carrying carton.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Write for free "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. LUBRIPLATE DIVISION, Fiske Brothers Refining Company, Newark 5, N. J. or Toledo 5, Ohio.

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BACKTALK AND FORETHOUGHTS

Edited by Marjorie E. Weissman

Wrong Photo Used In "Odors Out" Article

PLANT ENGINEERING:

"We note with interest your article 'Odors Out—Fresh Air In' in the July issue of PLANT ENGINEERING.

"The reproduction of the photograph shown in the upper right hand corner of page 113 purporting to be a cell manufactured by the Barnebey-Cheney Co. is actually a photograph of the Connor Dorex C-Cell. This unit is manufactured by us in Danbury, Conn.

"This photograph has been used by us in our advertising and occasionally in editorial matter published by technical journals to show the superiority of the Connor Dorex C-cell construction.

"No doubt, you will be interested to learn of this misadventure in reporting.

"We, of course have no way of knowing whether the photograph was furnished by yourselves or the Barnebey-Cheney Co." *P. F. Canavan, Vice President and General Manager, Connor Engineering Corp., Danbury, Conn.*

PLANT ENGINEERING:

"It has been brought to my attention that a photograph used in the article, 'Odors Out—Fresh Air In' (PLANT ENGINEERING, July 1959, pages 112-113) shows another company's activated carbon air purification cell rather than one of Barnebey-Cheney's, as the text indicates.

"To set the records straight and to alleviate PLANT ENGINEERING of any responsibility concerning the mistake, the following information is presented:

> "The facts, pictures and drawings used with this article were supplied to PLANT ENGINEERING by the Public Relations department of the Barnebey-Cheney Co. When assembling this data, we mistakenly forwarded a picture of a filter that is somewhat similar in construction to ours. The filter was not used in the job described in the article and to correct this implication, I am enclosing a photograph of the Barnebey-Cheney Model 7-FM FilterFo'd of the type that was installed.

"We are proud of the appearance, construction and durability of our cell and it was not our intention to mislead anyone. We sincerely regret any embarrassment caused to you or others by this oversight." *J. B. Witwer, Barnebey-Cheney Company, Columbus, Ohio.*

► We, too, deeply regret any embarrassment that may have been caused by this error. Of even greater importance, however, is the necessity for keeping PLANT ENGINEERING's readers informed, not misinformed. We are pleased that both Connor Engineering and Barnebey-Cheney concur in this respect.—*Editors.*

Construction Cost Estimating

PLANT ENGINEERING:

"I want to request a copy of the booklet that you plan to make available on the series of 'Construction Cost Estimating' that starts in the July issue. I assume you will send a bill for the cost of the booklet at that time.

"I am very much interested in such information as I have had to do a lot of estimating the 'hard' way over the past 20 years. Estimating for work to be done for a hospital is slightly different than for commercial or industrial buildings, but I am sure that the information contained in the series being published will be helpful.

"Thus I would like a copy reserved for me and in the meantime will enjoy the series each month of publication." *Leland J. Mamer, Engineer Asst. to Executive Director, St. Luke's Hospital, New York, N. Y.*

► There will be 11 articles in the series "Construction Cost Estimating" the last one is scheduled to appear in our May, 1960 issue. A nominal charge will be made for reprints of the series and those readers wishing to reserve a copy should address their request to the Editor, PLANT ENGINEERING, 308 East James St., Barrington, Ill.—*Editors.*

Home Study, Extension Courses

PLANT ENGINEERING:

"I am a regular reader and staunch supporter of PLANT ENGINEERING and I am directing this letter to the attention of 'Backtalk and Forethoughts' because it seems to receive the requests, comments, etc.

"I am an electrical engineer by training and a production manager by occupation. It has recently become imperative that I acquire a knowledge

For cooling water systems, the latest word is ENDCOR®

ENDCOR – new from Dearborn's research laboratories, gives better corrosion control at lower cost in open recirculating cooling water systems.

ENDCOR – promotes rapid film formation . . . is completely stable against oxidizing agents.

ENDCOR – sharply reduces corrosion rates and deposit formations . . . minimizes sludge adherence to heat exchange surfaces.

ENDCOR – permits operating any open system at higher pH readings . . . saves on acid.

Developed after exhaustive experiments, ENDCOR has been incorporated in Dearborn's Polychrome and non-chromate treatments and successfully tested under severest laboratory and operating conditions in customer plants for over a year. Available now in powder or briquette form. Your Dearborn engineer will be happy to fit these new treatments to the specific needs of your system. Call him today or write for detailed Technical Bulletin.

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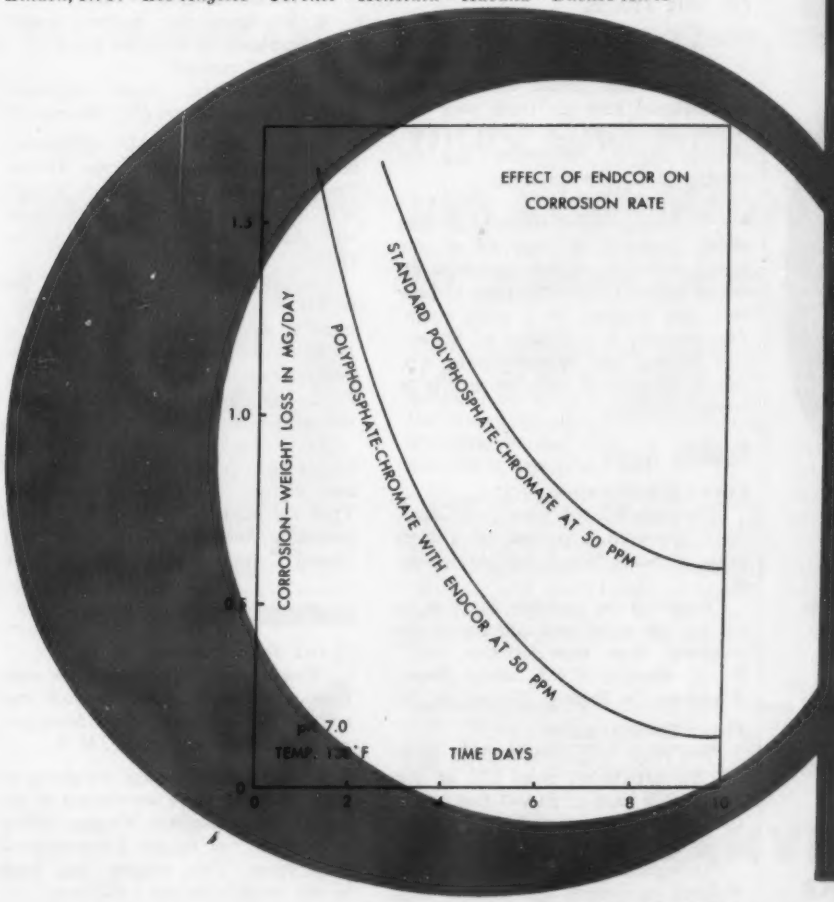

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pioneer in the science of corrosion control

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This Yarway team has scored high—over a million installed on all types of steam equipment. Stocked and sold by 270 Industrial Distributors. For free Steam Trap Book, write YARNALL-WARING CO., 145 Mermaid Ave., Philadelphia 18, Pa.

go YARWAY with confidence

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BACKTALK—FORETHOUGHTS

of setting up and operating a wage incentive standards system. There is but one T. and I.E. school I know of in the vicinity that offers such a course, but the available hours of class are impossible for me.

"My request is: Do you know of any correspondence course I could enroll in, or second best, could you recommend source books on the subject?

"I would certainly appreciate any information you may have on the subject." *R. E. Anderson, Namsco, Inc., Bellwood, Ill.*

► Information on courses offered by correspondence schools may be obtained from the National Home Study Council, 1420 New York Ave., N.W., Washington 5, D. C. For courses given by university extensions, write to the National University Extension Association, 152 Nicholson Hall, University of Minnesota, Minneapolis 14, Minn.—*Editors.*

For Safe Footing

PLANT ENGINEERING:

"We would be grateful for further information and greater detail about the enclosed item cut from your excellent publication." *J. F. Barry, Purchasing Agent, Alexander-Tagg Industries, Inc., Hatboro, Pa.*

► Our correspondent refers to an item which appeared on page 64 of our June, 1959 issue which describes adhesive Safety Grip strips used to provide safe footing on a plant ramp. The material is a product of Minnesota Mining and Manufacturing Co. and is available in rolls up to 3 ft in width.—*Editors*

Rockets Again

PLANT ENGINEERING:

"On page 123 of your June issue, there appeared a picture of a man using a rocket 'wand' fire extinguisher.

"Would it be possible for you to tell me the name and address of the company that manufactures this?" *H. E. Butters, F.P.E. Sales Dept., American La France, Elmira, N. Y.*

PLANT ENGINEERING:

"We read, with considerable interest, the article on page 122 of the June, 1959 issue of PLANT ENGINEERING, on the use of rocket power for quick welding.

"Ordnance has been investigating welding equipment that can be used to weld ferrous and nonferrous metals, that is light in weight and simple.

"Any information you can furnish as to where we can obtain more information on rocket power welding would be appreciated." *Lewis J. Bierbaum, Asst. Adjutant, Headquarters Rossford Ordnance Depot, Toledo, O.*

PLANT ENGINEERING:

"Will you please be kind enough to supply me with the name and address of the company which manufactures the 'rocket-fueled welding torch' shown on page 122 of the June issue of PLANT ENGINEERING." *H. D. Honan, Manager, Industrial Marketing, I-T-E Circuit Breaker Co., Philadelphia, Pa.*

PLANT ENGINEERING:

"We are very much interested in your article on 'New Maintenance Tool—Rocket Power' which appeared in the June, 1959 issue and would appreciate it very much if you would advise us where we can obtain additional information on the following items:

"1. Rocket-fueled wand for extinguishing fires.

"2. Prime mover rockets.

"3. Plastic covered welder.

"4. Self-firing fire fighter armed with heat-seeking infrared head.

"5. Retro rockets."

G. R. Kilbourn, Plant Engineer, Marion Power Shovel Co., Marion, O.

► Items 1 and 3 in Mr. Kilbourn's letter are manufactured by Grand Central Rocket Co., Redlands, Calif.; item 2 is made by both that company and Aerojet General Corp., Azusa, Calif.

The self-firing, infrared-seeking fire fighter missile is not yet in production. It was designed by a scientist at the California Institute of Technology. For information, write to the Public Relations Director of the Institute, Pasadena, Calif.

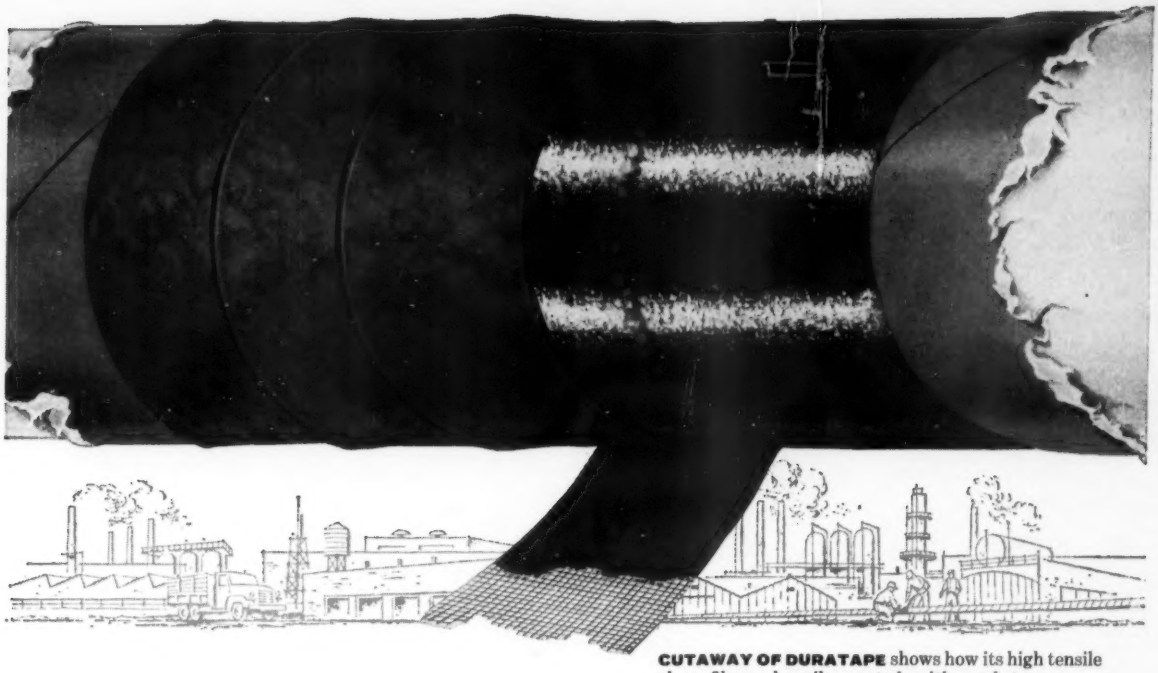
Retro rockets, used for truck brakes, are 'shelf' items, ready for use, and are relatively simple devices. They are made by a number of firms including Aerojet General Corp. and Grand Central Rocket Co.—*Editors.*

Continuous Weighing Scales

PLANT ENGINEERING:

"Please send information on continuous weighing scales for bulk materials." *A. P. Crane, Plant Manager, H. B. Reed Corp., Passaic, N. J.*

► Scales for continuous weighing of bulk materials were mentioned in the article "Materials Are Weighed While in Motion," in PLANT ENGINEERING, July issue. This request has been to the manufacturers.—*Editors.*



CUTAWAY OF DURATAPE shows how its high tensile glass fibers, heavily coated with coal tar or asphalt, provide an extremely durable dielectric shield.

Mill-wrapped pipe lasts only as long as its joints . . . that's why

more and more companies use Johns-Manville Duratape® to protect pipe joints

QUICK, EASY APPLICATION. Simply wrap primed joints with Duratape . . . flash-seal with low-temperature torch during and after application. Wrap can be similarly applied to elbows, tees and other pipe fittings.

J-M Duratape Joint Wrap is designed to give pipe joints the kind of protection they need to live as long as the rest of the pipe. It forms a tough dielectric barrier with excellent resistance to corrosive elements.

Made of high tensile glass fibers, and heavily coated with coal tar or asphalt, Duratape forms a tight bond with the pipe and a lasting seal against corrosion. In many years of actual use, this combination of inorganic glass fibers with coal tar (or asphalt) has proved to be far superior to organic base tapes.

Duratape is also fast and easy to install. This, plus its initial low cost, permits extensive savings on joint-wrapping. No problem with tearing, either, because of its strong, reinforcing glass fibers.

Your nearby Johns-Manville representative has samples and complete information. Contact him, or write to Johns-Manville, Box 158, New York 16, N.Y. In Canada, Port Credit.

WHEN ORDERING mill-wrapped pipe, be sure to specify the J-M "Partners in Pipeline Protection"... Blue Flag® Fiber Glass Wrap for enamel reinforcement with an outer shell of J-M Asbestos Felt . . . for *complete* pipe protection.

JOHNS-MANVILLE

JOHNS-MANVILLE JM PRODUCTS

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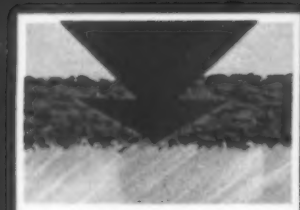


PENETRATES RUST TO BARE METAL

The specially-processed fish oil vehicle in the Rust-Oleum 769 Damp-Proof Red Primer penetrates rust to bare metal – as proved in radioactive tracing studies.

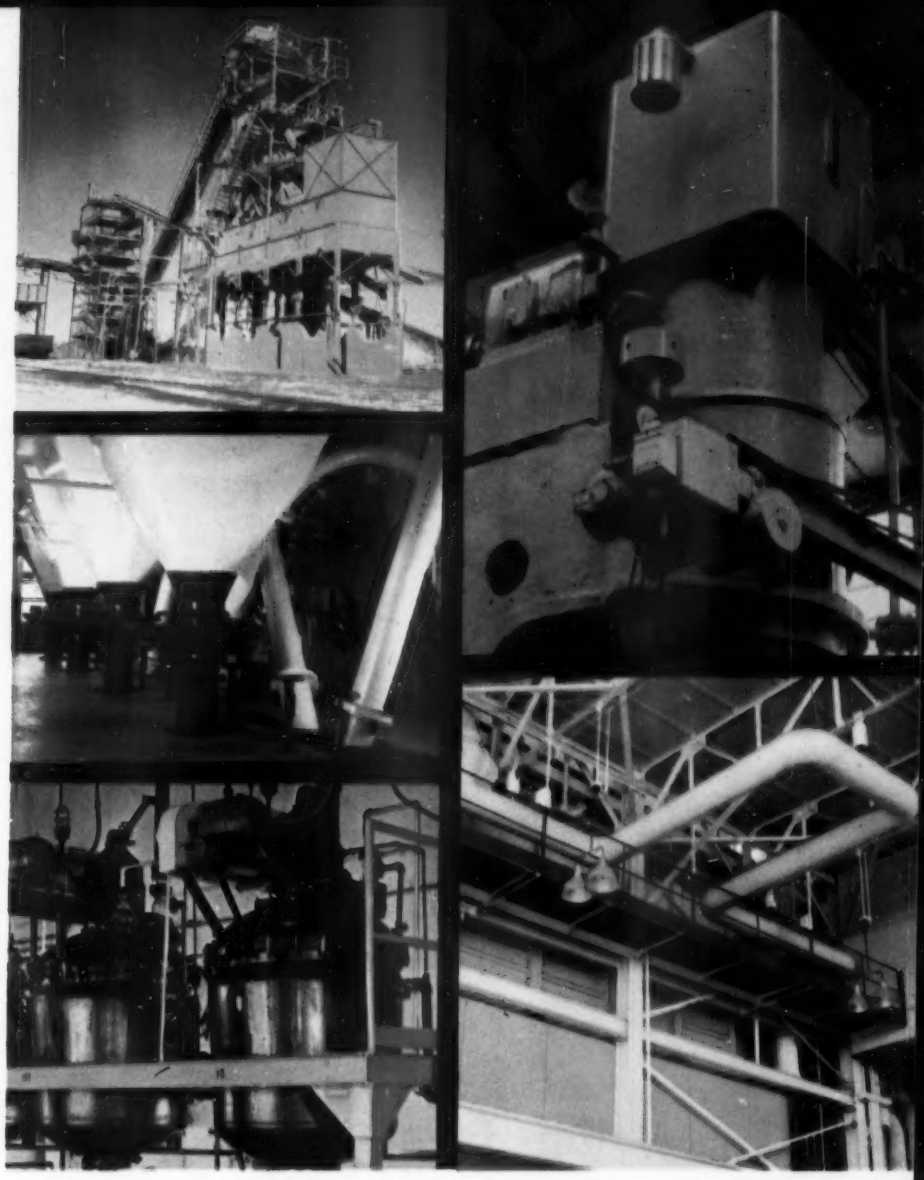
ON RUSTED SURFACES simply apply Rust-Oleum 769 Damp-Proof Red Primer directly over the sound rusted surface after scraping and wirebrushing to remove rust scale and loose rust. You stop present rust, because the *specially-processed* fish oil vehicle in the primer penetrates through the rust to bare metal – driving out air and moisture that cause rust. You save time and money – as costly surface preparations are usually eliminated. It's easier to use, too . . . because the "grease-like" nature of the fish oil vehicle in the primer enables it to slide over the surface and work its way through the rust formations – yet, it dries to a firm, protective, decorative coating that provides a tough, durable base for Rust-Oleum finish colors.

RUST-OLEUM®

STOPS RUST!®

SEE OUR CATALOG IN SWEET'S

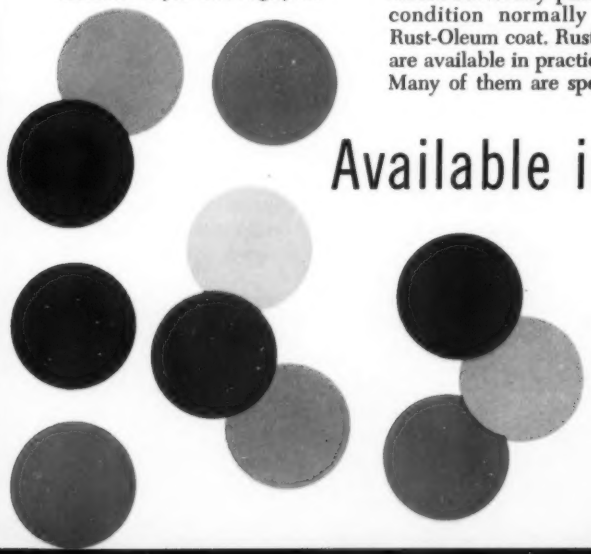
What the Rust-Oleum SYSTEM of lasting beauty does for you!



A matter of excellence.
Distinctive as your own fingerprint.

BRUSH OR SPRAY the Rust-Oleum finish color of your choice over 769 Damp-Proof Red Primer – that's the Rust-Oleum system of colorful, lasting beauty for rusted metal. Previously painted surfaces in good condition normally require only one Rust-Oleum coat. Rust-Oleum top coatings are available in practically ALL COLORS. Many of them are specially formulated to resist heat, chemicals, and other corrosion-producing conditions, while others are formulated to match the original colors on construction, farm, and oil field machinery and equipment. Try Rust-Oleum soon. Prompt delivery, efficient service, and a wealth of rust-stopping experience are yours through your nearby Rust-Oleum Industrial Distributor.

Available in all colors!

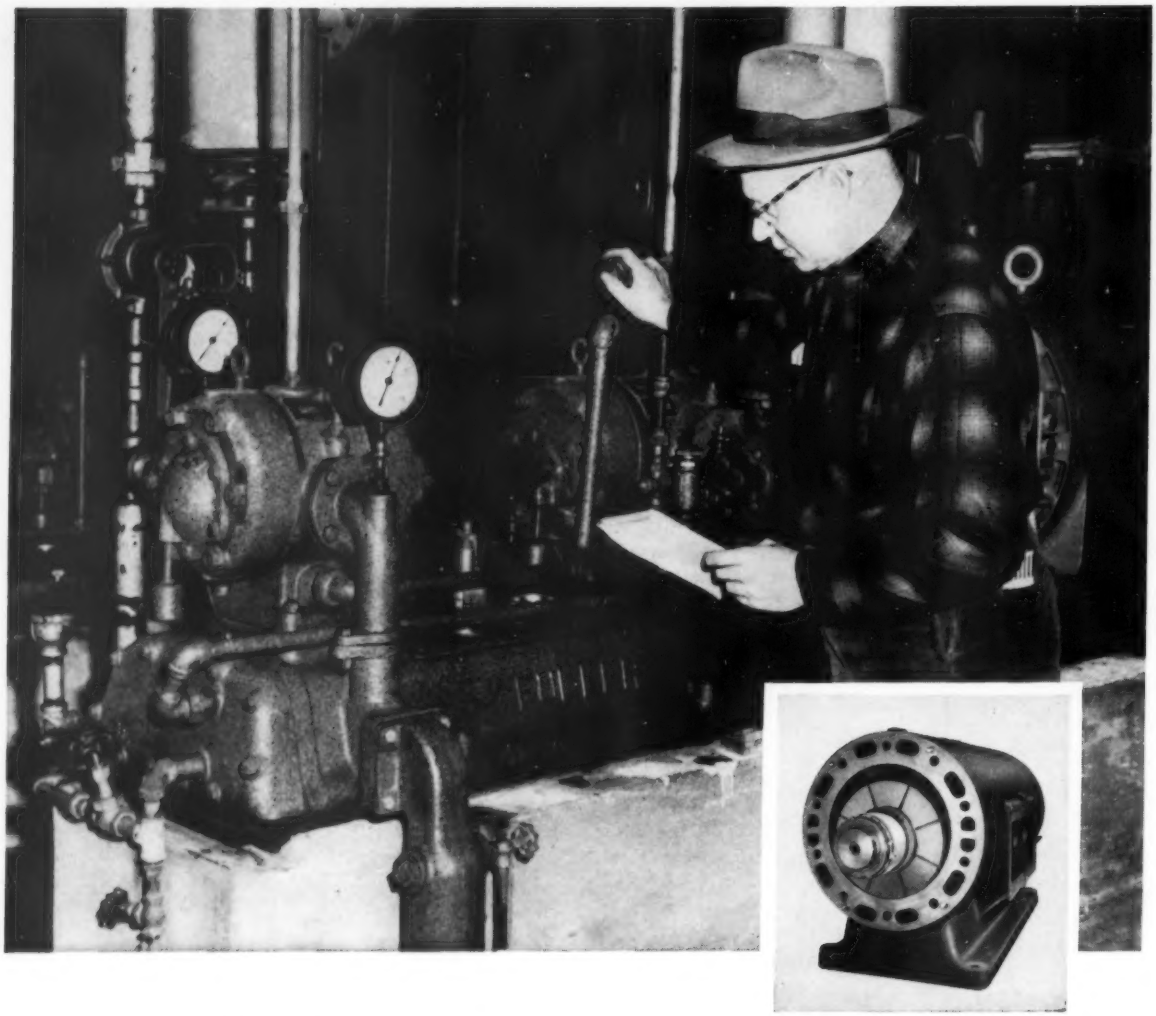


SEND FOR FREE TEST SAMPLE! ATTACH TO YOUR LETTERHEAD!

Rust-Oleum Corporation
2983 Oakton Street, Evanston, Illinois

Please send me the following at no cost or obligation:

- ☐ Free test sample of Rust-Oleum 769 Damp-Proof Red Primer for rusted metal surfaces.
- ☐ Complete literature with applications and color charts.
- ☐ Information on matching special colors.
- ☐ Thirty-page report on Rust-Oleum fish oil penetration.



How Fuller Rotary Vacuum Pumps Reduce Maintenance Costs, Boost Operating Vacuum for Robinson Clay Product Co.

BEFORE—Robinson Clay Product Co. installed their first Fuller vacuum pump two years ago, they had to do quarterly overhauls . . . repack blades as often as 3 or 4 times every year.

AFTER—with two Fuller vacuum pumps now maintaining desired vacuum on the clay molding presses—these time consuming, costly maintenance problems have been eliminated. Operating vacuum has been upgraded by 23%. AND the first Fuller machine—now over 3 years old—has needed no overhaul, no repair and no parts replacement!

WHY MAINTENANCE IS SO SIMPLE

Because the Fuller rotary vacuum pump has only three moving parts—rotor, bearings and blades—maintenance is minimized. Once each week, air filter bags are simply blown out with compressed air. Bearings are automatically lubricated. AND THAT'S ALL THERE IS TO IT!

Simple . . . Economical . . . Efficient? INDEED THEY ARE! Why not let us show you how you, too, can cash in on the advantages of Fuller rotary vacuum pumps and compressors. Just write today for descriptive literature.

1974
C-322-A

FULLER COMPANY
GENERAL AMERICAN
TRADE MARK

FULLER COMPANY
138 Bridge St., Catasauqua, Pa.
Subsidiary of General American Transportation Corporation
Birmingham • Chicago • Kansas City • Los Angeles • New York • San Francisco • Seattle

For more facts circle 525 on Reply Card

Fuller
....pioneers in harnessing AIR

For more facts circle 526 on Reply Card ⟶

This Standard Oil product made better grinding possible at Cessna

Aircraft Company's Industrial Products Division licked three problems with ARGON Oil No. 4

Situation: A fluid used in grinding operations at this Cessna plant at Hutchinson, Kansas, was creating three problems:

1) It washed the lubricant from regulator wheels and grinding fixtures, causing them to freeze.
2) It caused build-up of deposits.
3) It stripped paint from machine surfaces.

What was done: Cessna management called in a Standard Oil lubrication specialist who recommended ARGON Oil No. 4 in ratios of 100 and 150:1 for test. The coolant was tested in two centerless grinders for two months.

What happened: All three conditions which were hampering operations were cleared up when the switch was made to ARGON Oil No. 4. Cessna also found that work remained rust-free after passing through the machines, something that had not been the case before. They also found that the coolant didn't foam. With no foam, more of it stayed on the wheel, resulting in cooler operation. Faster cuts were obtained with finer wheels. All 12 grinders in the Cessna shop were then converted to ARGON Oil No. 4.

What you can do: Get more facts about ARGON Oil No. 4 from the Standard Oil office near you in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Quick facts about **ARGON Oil No. 4**

• Clear, transparent fluid • Able to control corrosion and rust on work and machines • All chemical. Does not support bacteria growth • Unaffected by humidity • Fire resistant • Odorless

Jerry Croes, Standard Oil staff engineer, Paul Hoyer, Cessna section superintendent and Bill Ray, Standard Oil lubrication specialist (l. to r.) inspect rust-free finish after grinding with ARGON Oil No. 4 while J. E. Petrie (far left), operator, looks on. Both Jerry Croes and Bill Ray have plenty of experience in this sort of work. Jerry has been at it for 16 years. He has an engineering degree from South Dakota School of Mines & Technology and has completed the Standard Oil Sales Engineering School. Bill has six years service working with industrial customers.

You expect more from **STANDARD** *and you get it!*

PERFOR

Number 1 reason why your best bargains

IN FLUORESCENT LAMPS, buying on price alone is no bargain at all. (Because the price of the lamps averages only 10% of your operating costs of light.) The other 90% goes for electricity and maintenance. Conclusion? The *best* lamp bargain works your lighting dollar the hardest, gives you the most *light* for your money.

How do G-E Fluorescents stack up? Take the popular 4-foot, 40-watt. The new General Electric PREMIUM 3 Lamp, announced in 1959, delivers more light per watt than any previous 4-foot fluorescents. As for maintenance—out of every 1,000 G-E 40-watt fluorescents you buy today, on the average 999 have no defect which can keep them from working—and 990 will still be burning late in 1961! Practically maintenance-free performance like this makes G-E 40-watt, slimline, high output and the exclusive Power Groove Lamps your best bargains in fluorescent light.

IN MERCURY LAMPS, you have the source which can give you the lowest cost of light of any type of lamp commercially available. Lower than filament—often lower, even, than fluorescent. *And General Electric Mercury Lamps, at any given time in their life, will outperform any other brand the same age . . .* and are built to last as long or longer!

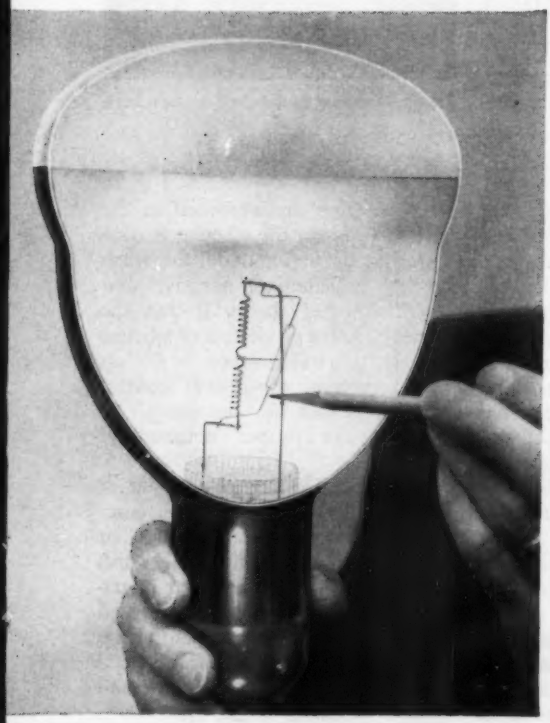
How? To name a few—General Electrics' dramatic new Bonus Line electrodes, better arc-tube design, and fewer parts to intercept light. And a new 1959 line of six G-E Bonus Line 400-watt Mercury Lamps are your *biggest* bargain in mercury light.

IN FILAMENT LAMPS there are some important differences between brands—some of which are detectable even *before* you put the lamp in a socket. Like the new 1959 smaller, brighter, 100-watt lamp bulb that's small as a 60-watter but delivers more initial light than two 60's. Or the new 1959 G-E Quartzline lamps that are pencil-thin but pack up to 1500 watts.

Or like the new 1959 RB-52 Bonus Line 1000-watt reflector lamp shown at right. Special bulge shape distributes heat, so a less-costly, regular glass is used—with savings passed on to you. And look! It uses General Electric's stand-up filament that delivers more light than ordinary "draped" type, has more expensive *silver* reflector instead of aluminum. It gives you 20-30% extra light on the work plane. Big things are happening in G-E Filament lamps—all pointing to a bigger bargain in filament light for you.

MANCE

in light are General Electric Lamps



IF YOU'RE BUYING REPLACEMENT LAMPS or installing new lighting . . . it's easy to pick the General Electric Lamp that'll give you the *best bargain in light* . . . whether you use filament, fluorescent or mercury. Your best bet is to see your General Electric Large Lamp supplier. He'll help you pick the lamp type, size and "color" best for your particular application. Remember, General Electric Lamps are tops in performance—the best combination of light output, lamp life, reliability and color.

FREE FROM G.E. Right now... today you can get a startling new 20-page picture paper packed with factual information on lamps and lighting that can save you big money. Write for your free copy today. Just send your name, company, address, to General Electric Co., Large Lamp Dept. C-931, Nela Park, Cleveland 12, Ohio. Be sure to ask for "FACTS OF LIGHT".

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 527 on Reply Card

PLANT ENGINEERS' DIGEST —so those who rush may read and know what's new

Edited by Marjorie E. Weissman

Blankets for Brazing Direct Heat to Point of Use, Do Job Fast

A NEW BRAZING method that embodies both a new type heat source and a means of directing all but a fraction of the heat generated into the part being brazed will shortly be introduced in our plant.

The innovation, developed jointly by our company and Electrofilm Inc., North Hollywood, is a high-temperature wire mesh heater in a blanket of high-temperature silica insulation. It is used for brazing stainless steel honeycomb sandwich structures.

The work cycle follows roughly the same pattern as the present production cycle using a furnace, except that it is completed in a fraction of the time. It calls for raising the temperature of the part to be brazed to 1650 F, holding it briefly at that level, then dropping the temperature to 1400 F for 1½ hr. Cooling and refrigeration follow. Tests show that the blanket method can be expected to average about six hours compared to 23 hours by present methods.

The new method can also be better controlled than the old. Heat input can be varied on different parts of the same panel.

Blankets require little more space than the workpiece itself. In high production, they might be stacked to provide still further economy in space. Engineers also foresee the use of one control system operated in sequence for a number of brazing operations. *From Rohr Magazine, published by Rohr Aircraft Corp., Chula Vista, Calif.*

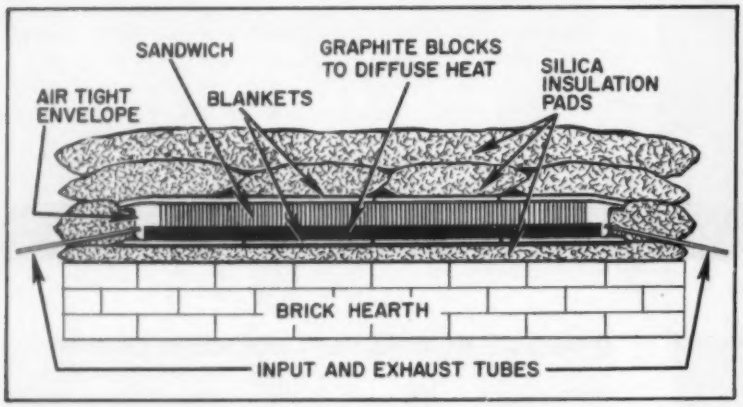


Diagram shows how blankets form envelope around honeycomb to be brazed.

Insulation must be checked for heat loss.

Effect of Silicone on Enclosed Motors and Generators

RECENTLY, propulsion generators in several submarines had very rapid brush wear immediately after being overhauled. In one instance, newly installed brushes wore down to the rivets in approximately three weeks of operation.

Tests and investigations showed that the rapid brush wear was caused by the use of silicone rubber hook-up wire for connecting the shunt fields, and silicone impregnated glass-mica-glass tape applied to some of the interior bus work. Also, on some of the generator armatures the the silicone GMG tape had been used to isolate groups of strands of banding wire.

The silicone hook-up wire and the silicone tape on the bus work were replaced by non-silicone materials, and the generators were cleaned to remove the carbon dust deposits. When the generators were returned to service, the brushes resumed their original very light wear rate.

The several generator armatures that had silicone tape between and under the banding wire and could not have this material removed unless the generators were removed from the ship were fitted with special silicone-resistant brushes. The brushes are not a complete answer to the problem because they will probably have a higher wear rate than regular brushes.

The mechanics of silicone effect on brush wear is not completely understood. However, it appears that when even minute amounts of silicone vapor are absorbed in the carbon brushes, the silicone is converted by the arcing under the brush face to a sandlike, abrasive material. Another theory is that the water-resistant properties of silicone prevent the water vapor in the air from reaching the brush contact surface, which is necessary for forming the proper commutator film.

It is known that any amount of any type of silicone varnish, compound, rubber, grease, laminate, or binder will cause abnormal brush wear, and must be avoided in enclosed d-c machines or enclosed a-c machines having collector rings within the machine enclosure.

The use of any amount of sili-

(Continued on page 42)

CROUSE/HINDS

Condulet®
electrical equipment

the one complete line for corrosive locations

Photo shows Feraloy Condulet conduit fitting after several years exposure to hydrochloric acid. Note extreme deterioration of conduit.

RESISTS chemical and galvanic corrosion

RESISTS acids, alkalis, salts

RESISTS varying concentrations and temperatures of corrosive liquids, vapors, gases, dusts

Corrosion problems would be simple if there were a single material which would resist all corrosive substances.

Since there is not, Crouse-Hinds provides electrical equipment in four materials which offer a selection to meet virtually every known corrosion problem . . .

FERALOY® features the desirable characteristics of cast iron: strength, corrosion resistance, versatility, adaptability, economy. Plated with zinc and cadmium, Feraloy Condulets will combat most corrosive elements.

ALUMINUM ALLOY develops its own self-repairing oxide film which resists a number of corrosive conditions. Copper-free Aluminum Alloy Condulets effectively resist galvanic corrosion.

PLAST-A-COAT, a polyvinyl chloride, is a resilient coating which withstands abrasion and repels corrosion from caustics, alkalis and heavy mineral acids. Tough, non-peeling, it also acts as an insulator.

SILICON BRONZE, when all other materials fail, can be furnished for the most extreme corrosion problems. Counteracts virtually all alkalis as well as salt water, sulfur gases, etc.

CROUSE HINDS
SYRACUSE NEW YORK

Write for **BULLETIN #2699** containing full information on Crouse/Hinds Condulets for Corrosive Locations.

Offices: Atlanta, Baton Rouge, Birmingham, Boston, Buffalo, Charlotte, Chicago, Cincinnati, Cleveland, Corpus Christi, Dallas, Denver, Detroit, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, New Orleans, New York, Omaha, Philadelphia, Pittsburgh, Portland, Oregon, St. Louis, St. Paul, Salt Lake City, San Francisco, Seattle, Tulsa, Washington. Resident Representatives: Albany, Baltimore, Reading, Pa., Richmond, Va.
Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.
Crouse-Hinds Instrument Company, Inc., Silver Spring, Md.

For more facts circle 528 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

cone materials in enclosed d-c machinery or a-c machinery with slip rings in the enclosure must be avoided.

Silicone materials adjacent to open d-c machines in areas of restricted ventilation may also cause abnormal brush wear.

Silicone materials may be successfully used in parts of well-ventilated open d-c motors and generators in which the incoming air passes over the commutator before entering the windings. *From Bureau of Ships Journal, published by Bureau of Ships, Department of the Navy, Washington, D. C.*

Skids Take Tools to Work Site

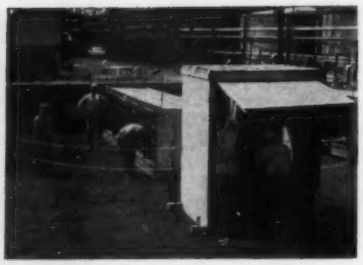
A NEW AND successful method of supplying tools and maintenance material for major unit shutdowns was initiated during 1958 at our Philadelphia refinery.

By eliminating trips between tool and storeroom and job sites to obtain or return materials and tools, we have made substantial savings. The men on the job using these facilities have contributed greatly to the success of the system.

Specially designed skids with doors that open and close easily but which can be locked, are moved to loading locations in the central warehouse. Storekeepers take inventory of material remaining in the skids from previous shutdown jobs and restock items where necessary. The skids are then moved by an industrial carrier to the unit shutdown site. A modified overhead door and ramp at the warehouse allow the carriers to move inside the building. This arrangement eliminates double handling of the material.

Skids are spotted in work areas inside battery limits so that electrical service can be provided for the late shifts. With the skids in place, bolts, nuts, fittings flanges, etc. and tools can be obtained from them as required without the need for time consuming trips to the room.

A portable issuing counter, equipped with telephones, is part of the arrangement and goes along with the skids to the shutdown site. Toolhousemen man the skids during shutdown to control the issue and check-in of all tools used. Daily inventory is made of the materials on the skids and replacement is made where necessary. *From The Atlantic Magazine, published by Atlantic Refining Company, Philadelphia, Pa.*



Tools are checked in and out of portable skids at telephone equipped counter. Electric light is available so that skids can be used for night time work.

Flexible Connectors for Food Processing Lines

Foreman checks flexible connector designed to reduce noise vibration, and eliminate leakage at Frank M. Wilson Co., Inc., food plant, Stockton, Calif. Connectors withstand 200 F. (From release of the B. F. Goodrich Company, Akron, Ohio.)

"Hot Maintenance" for Switchgear

A UNIQUE GENERAL cleaning of an electrical switchboard for 130 kv power, has been performed as part of the "hot maintenance" program of the Swedish State Power Board, without disconnecting the current.

At the first large-scale test of this method, which took place at the Koping switchboard, the porcelain insulators were given a water shower to remove dust menacing the operation of the equipment. The dust originated at nearby cement and chemical industries.

A vigorous cascade of water was directed towards the 130-kv switchboard equipment. At first, long sparks ran along the porcelain insulators. After a short while, there was only a slight crackling which died away when the insulators dried.

This method of cleaning the equipment was developed at the Power Board's High Tension laboratory to avoid repetition of a previous interruption of the operation of the equipment. On that occasion, interference of the dust had necessitated downtime while cleaning was done by hand.

Experiments at the laboratory showed that it was possible to render harmless the leakage of current through the jet of water by determining the shortest distance that

(Continued on page 44)

The plant that never shuts down can't take a chance on Steam Traps

by John W. Ritter, Test Engineer
SARCO Company, Inc.

It pays to take a careful look at the economics of the whole problem of steam trapping. This is particularly true where a plant is operating continuously.

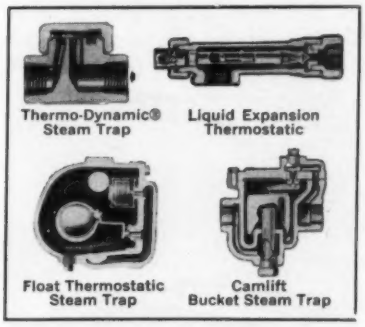
Twenty-four hour, 7-day production can be a mixed blessing. There is a great satisfaction in working to full capacity, but it doesn't leave much time to keep the equipment in first class working order. If major repairs or replacements become necessary, the partial shut-down that results can disorganize the whole output schedule.

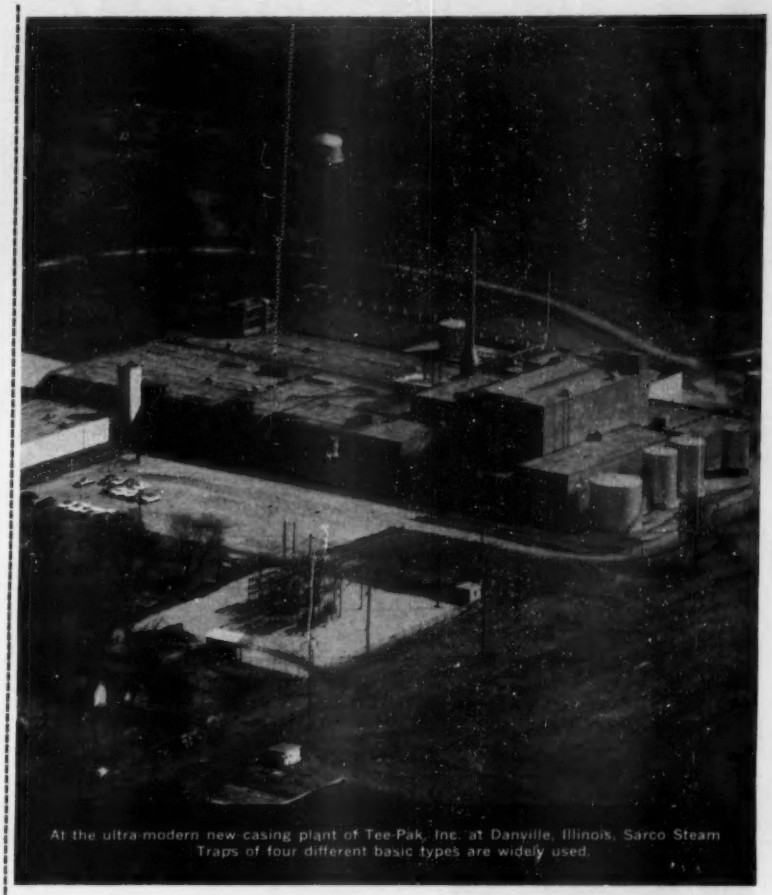
Some steam traps are much easier to maintain than others, and it pays to look into this easy maintenance feature of traps as carefully as you examine their operating characteristics.

Another important point in steam trap selection is to be sure the right trap is chosen for each job. Plant engineers know the operating conditions and if new questions arise on which they want supplemental consultation, they can have their questions answered without cost or obligation by a group of men who have real depth and breadth of experience in *production planned* steam trapping – Sarco engineers. Sarco advice is always impartial advice, because Sarco makes all five types of steam traps.

Sarco engineers, for example, can demonstrate the economy of the Sarco TD-50, which is as near maintenance-free as a steam trap can be. They can show the special values of the Sarco Thermostatic, which requires no adjustment over a 300 psi operating range. There are any number of uses for the continuous discharge of the Sarco Float-Thermostatic particularly when closely controlled temperature must be maintained.

For every steam trapping need there is one best steam trap, ideal in its operating functions and built for an absolute minimum of required service and maintenance. Studying your individual plant needs in steam trapping, and filling these needs with the traps best suited to do their respective jobs will pay out handsomely in your production and operating records.





At the ultra-modern new casing plant of Tee-Pak, Inc. at Danville, Illinois, Sarco Steam Traps of four different basic types are widely used.

At Tee-Pak's new casing plant they depend on SARCO Steam Traps to help prevent down-time

Twenty-four hours a day – seven days a week. That's the operating schedule at the modern new Danville, Illinois, plant where Tee-Pak produces its cellulose casings. Requiring dependable operation from all equipment, the company has used four different types of Sarco Steam Traps, each selected to do a reliable, trouble-free job in its particular application.

When you have a steam trapping problem, whether it's a single installation or dozens of different applications, consult your local Sarco representative or write Sarco directly for impartial advice on *Production Planned* steam trapping, because . . . 7945

SARCO
COMPANY, INC.
635 Madison Ave., New York 22, N. Y.

Only Sarco makes all 5 types:
Thermo-Dynamic • Thermostatic • Liquid Expansion
Float Thermostatic • Bucket

STEAM TRAPS • TEMPERATURE CONTROLLERS • STRAINERS • HEATING SPECIALTIES

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1.*

DAYLIGHTING DO's and DON'Ts

FOR PROGRESSIVE PLANT ENGINEERS

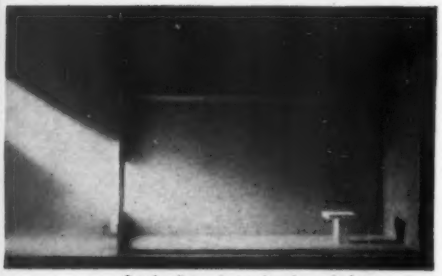
* No. 1 of a series to help Engineers increase plant efficiency and economy.

DON'T expect maximum daylighting value from just any glazing medium

In good industrial daylighting practice, the problem is to provide enough light at working levels distant from the windows while avoiding a high concentration of lighting next to windows. To accomplish this uniformity of lighting, some diffusion must be employed to throw a portion of the available light directly to the far side of the room.

Translucent light diffusing glass by Mississippi is "Visioneered" for better daylighting, scientifically designed to distribute light to best advantage. Furnished wired and unwired in a variety of industrial patterns and surface finishes, Mississippi rolled glass is available at leading distributors of quality glass.

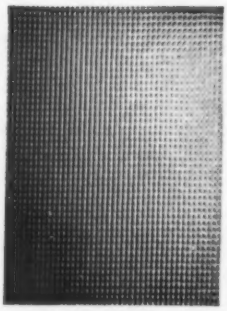
Photograph shows "Smoke Box Room" with its window glazed with clear glass.



Smoke Box photo showing window glazed with a diffusing glass.

DO INSIST ON GLASS FOR GLAZING

In buildings new or old, glass and glass alone possesses the desirable characteristics of chemical stability, permanence of finish, color, shape, surface hardness and non-inflammability. Buy, specify, insist on glass. See your Mississippi Glass distributor.



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MISSISSIPPI GLASS COMPANY

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WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

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PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

could be allowed between the sprinkler nozzles and the live wire. Two-thousandths of an ampere was set as the maximum possible leakage.

The tests demonstrated that a municipal water supply is less suitable because of too-low electrical resistance and that water from a stream or brook is to be preferred. *From Vi i Vattenfall, published by the Swedish State Power Board, Stockholm, Sweden.*

Loading Dock Leveler

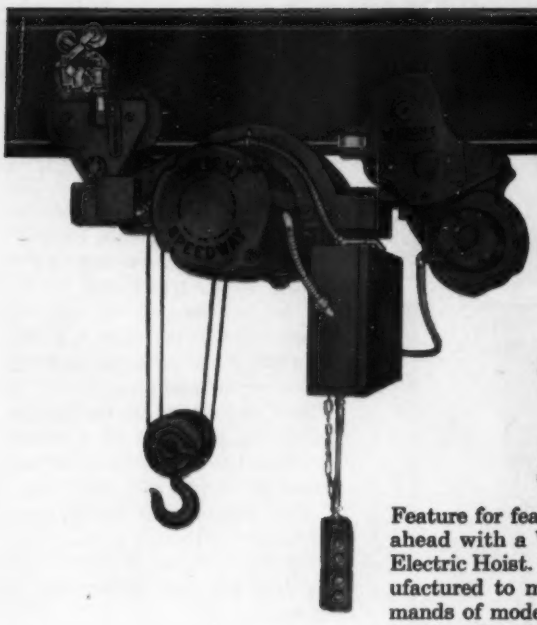
THE CONSOLIDATED Paper Company of Monroe, Mich., producer of corrugated and fibre shipping containers, had a loading dock problem. The company needed facilities to load at least 25 trucks a day, so speed was one essential. An equally important consideration was the fact that customers' trucks were involved—all kinds and sizes of trucks, with a consequent wide variation in bed heights.

That meant some would be too high or too low for electric platform loading trucks to move in and out of the carriers easily over dockboards or ramps.

The solution was the installation of 10 rotary truck levelers, hydraulically operated devices which are recessed into the loading dock pavement and raise or lower the truck bed to bring it level with the dock surface.

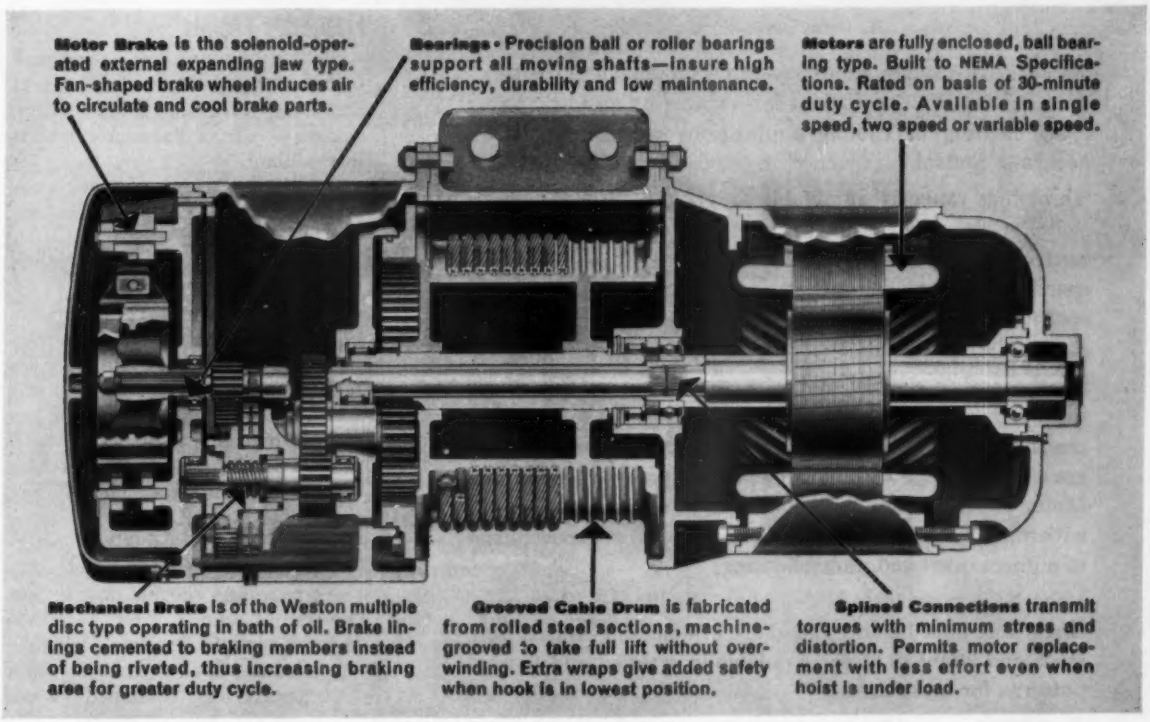
Each leveler consists of a 10-ft by 14-ft platform, floored with nonskid steel plate, hinged at one end and supported at the dock edge by

Dock levelers accommodate any size of truck, and are hydraulically operated.



You Can't Buy a Low-Priced Hoist with the Outstanding Performance and Maintenance Features You Get as Standard Equipment from Wright

Feature for feature, you are years ahead with a WRIGHT *Speedway* Electric Hoist. Designed and manufactured to meet the varied demands of modern high speed production, *Speedway* Hoists give you the safety, adaptability, ruggedness and efficiency which you can't get in a low-priced hoist. Many of these performance and maintenance features are exclusive with WRIGHT. So if you are considering the purchase of an electric hoist, it will pay you to investigate the advantages of WRIGHT *Speedway* Hoists. For complete information, write our York, Pa., headquarters for **Catalog E-58.**


Motor Brake is the solenoid-operated external expanding jaw type. Fan-shaped brake wheel induces air to circulate and cool brake parts.
Bearings • Precision ball or roller bearings support all moving shafts—insure high efficiency, durability and low maintenance.
Motors are fully enclosed, ball bearing type. Built to NEMA Specifications. Rated on basis of 30-minute duty cycle. Available in single speed, two speed or variable speed.
Mechanical Brake is of the Weston multiple disc type operating in bath of oil. Brake linings cemented to braking members instead of being riveted, thus increasing braking area for greater duty cycle.
Grooved Cable Drum is fabricated from rolled steel sections, machine-grooved to take full lift without overwinding. Extra wraps give added safety when hook is in lowest position.
Splined Connections transmit torques with minimum stress and distortion. Permits motor replacement with less effort even when hoist is under load.

WRIGHT HOISTS

Wright Hoist Division • American Chain & Cable Company, Inc.

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ACCO

For more facts circle 531 on Reply Card

THE MARK OF QUALITY
BARBER COLMAN

New proportional regulator provides highly accurate control of temperature

For water, gas, or steam

Temperature ranges from −40° to +350° F

Calibrated temperature dial

Positive positioning

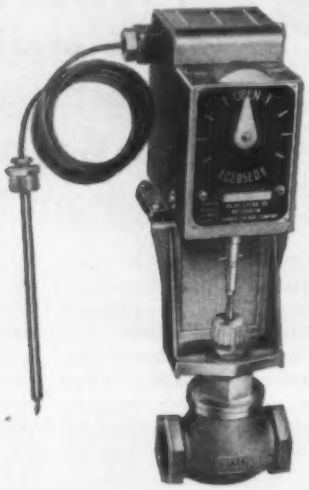
Fully proportional

Tight closing

High reliability

Self-contained

Easy-to-read valve position indicator



New Barber-Colman motor-operated proportional temperature regulators offer distinct advantages on any process or space heating or cooling applications requiring positive, accurate control.

Throttling range is adjustable from 2 to 25°. Auxiliary switches provide means of interlock to pumps, boilers, refrigeration compressors, etc. Optional features include speed adjustment, fail-safe spring return, and neutral band operator for heating/cooling.

Construction is exceptionally rugged and dependable. A positive-acting electric motor operator delivers full power throughout the complete valve operating stroke, assuring positive shutoff and accurate throttling. Motor operators are offered for use with most commonly used power sources. Motor and gear train are submerged in oil for long life and with minimum maintenance. A built-in feedback mechanism minimizes over- and undershooting.

Valve body types include single seat, double seat, three-way, single seat pilot balanced, and are available in bronze, iron, steel, and stainless steel. Available in screwed and flanged patterns for most sizes.

Regulators are sold complete, ready to install. For detailed specifications, call your local Barber-Colman Automatic Controls office, or write for descriptive literature.

"Better Control . . . Electrically"

BARBER-COLMAN COMPANY

Dept. V, 1339 Rock Street, Rockford, Illinois

For more facts circle 532 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

two oil-hydraulic jacks. Capacity is 40,000 lb.

Consolidated's dock is 48 in. high, and the levelers are installed to travel 14 in. up or down. The standard 28-in. travel can be divided in any manner to conform with any dock installation. A center curb wheel guide positions highway vehicles on the platform.

Power is supplied by oil-hydraulic pumping units. In the Consolidated installation, two truck levelers operate off each power unit. Selector valves and pendant control ropes are located at the side of the dock, putting the operator in view of the equipment but out of the way of dock traffic.

A bonus feature is the additional space gained by installing the truck levelers. *From a release of Rotary Lift Co., Memphis, Tenn.*

Flammable Liquids

THE FOLLOWING are suggestions for minimizing the possibilities and the extent of damage from a fire caused by use of flammable liquids in the plant.

1. Eliminate use of low flash-point flammable liquids whenever possible.
2. Substitute less dangerous liquids wherever practicable.
3. Reduce quantities of flammable liquids within plant by reducing exposed liquid surfaces. Provide detached, isolated heated areas for warm-up of liquids normally stored outside in cold weather.
4. Provide adequate protection for the building and machines using flammable liquids:
   a. Automatic sprinkler protection for building, preferably providing specific design density.
   b. Automatic carbon dioxide, foam, dry chemical, water spray or combined water spray-foam systems.
   c. Automatic sprinkler protection for equipment to a specified design density.
   d. Extra hand and wheeled portable fire equipment in addition to usual complement.
   e. Automatic emergency drains

For more facts circle 533 on Reply Card ⟶

KEEP OIL WHERE IT BELONGS...

Garlock metal scraper rings prevent leakage, excessive oil consumption

Garlock Style #4400 Scraper Rings allow an exact coating of oil on the shaft . . . return excess to the crankcase. Design benefits are many—*two* scraping edges add greater scraping efficiency, special drain holes relieve pressure buildup, balanced bearing areas prevent "tipping" of the ring.

All rings have a surface finish of less than 10 micro-inches . . . are flat within light band readings . . . come in cast iron, bronze, hi-lead super bronze, babbitt, carbon, TEFLON*.

Scraper rings are part of a complete line of Garlock Metal Packings for positive sealing on pumps, engines, and compressors. Designed for the toughest applications, Garlock metal packings are presently handling temperatures as high as +800°F and pressures to 35,000 psi.

Metal packings and scraper rings are more of the Garlock 2,000 . . . two thousand different styles of packings, gaskets, and seals for every need. Consult your local Garlock representative for more information, or write

THE GARLOCK PACKING COMPANY, Palmyra, N.Y.

For Prompt Service, contact one of our 26 sales offices and warehouses throughout the U. S. and Canada.

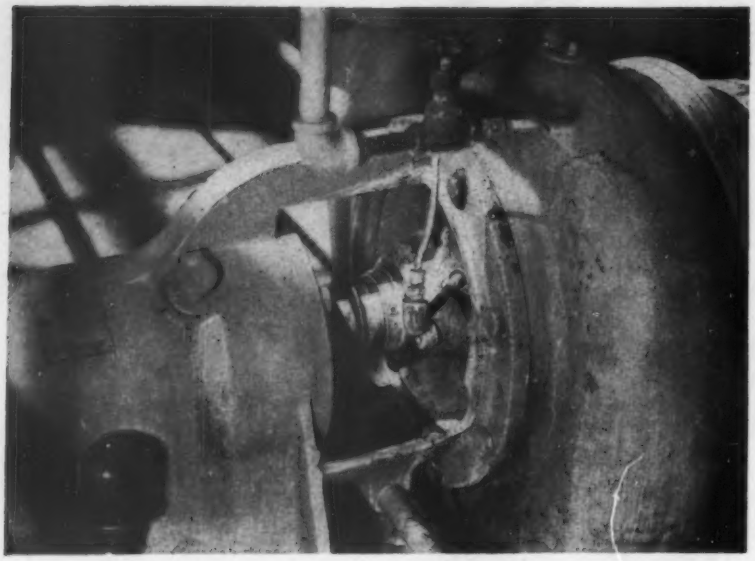
**DuPont Trademark for TFE Fluorocarbon Resin*

GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Molded and Extruded Rubber, Plastic Products

Plastics Division: United States Gasket Company

Canadian Division: The Garlock Packing Co. of Canada Ltd.



CHEMPRO MECHANICAL SEAL "HOLDS THE LINE" AGAINST 560,000,000 GALLONS OF ORANGE JUICE CONCENTRATE

In September, 1956, CHEMPRO MECHANICAL SEALS* were installed in 4 Allis-Chalmers high speed pumps located at the Minute Maid processing plant in Leesburg, Florida. The pumps recirculate orange juice through evaporators used to produce frozen orange concentrate.

So far, each pump and SEAL has handled approximately 560,000,000** gallons of concentrate. This service is so tough that most other previously used packings and seals needed frequent replacement. The original CHEMPRO MECHANICAL SEALS are still in operation *and there has been no leakage whatsoever in any of the pumps.*

* CHEMPRO MECHANICAL SEAL, Size 250 WLC, quenched, 316 stainless steel with Carbon vs. Ceramic Seal Faces.

** Pump handles 2,000 gal. of concentrate per minute and runs 24 hours per day, 7 days per week, for 7 to 8 months each year.

For information on CHEMPRO MECHANICAL SEALS IN TOUGH SERVICE, WRITE FOR BULLETINS CP-551 and 575.

CHEMICAL & POWER PRODUCTS, INC.

The Original Fabricators of Teflon Packings and Gaskets

7 Broadway, New York 4, N.Y.

For more facts circle 534 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

to remove liquid from area of fire.

f. Overflow drains, floor drains, curbs, and wall scuppers.
g. Explosion relief for equipment and building.
h. Masonry cut-off walls.
i. Detachment of operation.
j. Automatic roof vents.
k. Deep, noncombustible curtain boards.
l. Proper electrical and heating equipment.
m. Adequate exhaust ventilation.
n. Underwriters' Laboratories approved safety containers.
o. Combustible vapor analyzer.

5. Provide fully trained plant fire brigade.

6. Thoroughly acquaint public fire department with problems to be encountered at your plant.

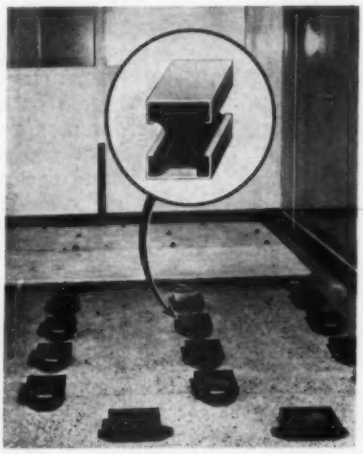
7. Provide good preventive maintenance of all equipment, operational and protective.

8. Maintain excellent housekeeping. *From Sentinel, published by Factory Insurance Association, Hartford, Conn.*

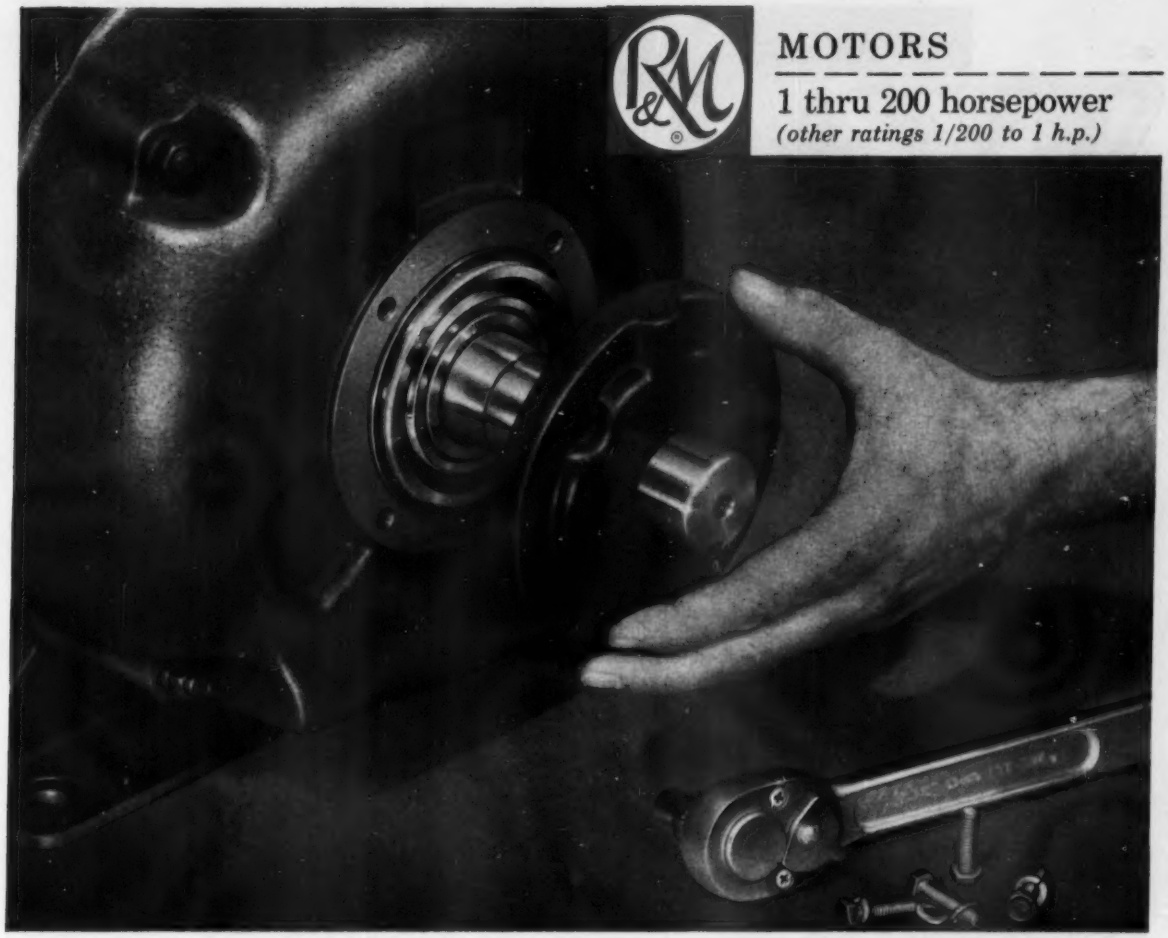
"Floating" Floor

NOVEL USE was made of neoprene vibration dampeners by the Upjohn Co., Kalamazoo, Mich, in a recent addition to their laboratory facilities.

The addition included an animal observation and experimentation



Floating floor is laid over neoprene vibration dampeners enclosed by steel.



MOTORS

1 thru 200 horsepower

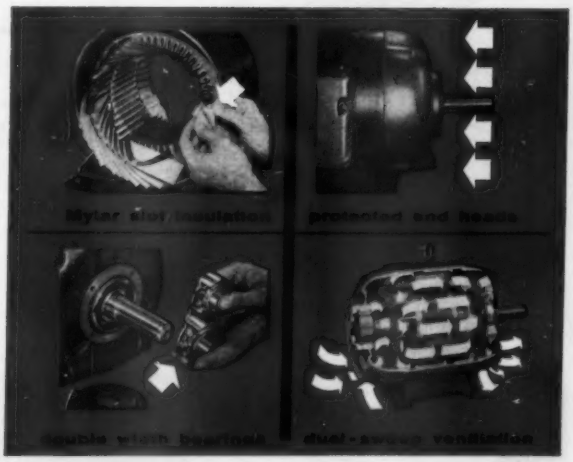
(other ratings 1/200 to 1 h.p.)

"On-the-Job" Bearing Inspection and Relubrication are Easy!

ROBBINS & MYERS motor bearings are fully sealed and pre-lubricated to operate for years without attention of any kind. However, when maintenance schedules call for bearing inspection and relubrication at shorter intervals, R&M motors cut downtime and save labor expense by making these inspections easy. The bearing cap on each end head comes off quickly when the four securing bolts are removed. The bearing seal, held in place by removable snap rings, likewise, is easily removed to expose the interior of the bearing.

Easily removable bearing caps are only one of R&M's many desirable design features. Double width bearing races have extra-large grease capacity . . . Mylar* insulation that has 8 times the dielectric strength and 35 times more moisture resistance than ordinary paper insulation . . . end heads offer full-height protection . . . dual-sweep ventilation assures efficient cooling. For details, write today for Bulletin 520 PE

**DuPont registered trademark*



ROBBINS & MYERS, INC.

motors, household fans, Propellair industrial fans, hoists, Moyno industrial pumps

SPRINGFIELD, OHIO · BRANTFORD, ONTARIO

For more facts circle 535 on Reply Card

*

GTC

*an effective, economical industrial communication system designed to provide swift and sure voice communications regardless of distance or surrounding noise conditions.

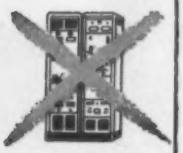
. . . THE UNITIZED COMMUNICATION SYSTEM . . .

COMPLETELY TRANSISTORIZED AND DESIGNED TO MEET THE CRITICAL REQUIREMENTS OF INDUSTRY

1. An effective, economical industrial communication system designed to provide swift and sure voice communication under adverse environmental conditions such as extremes of temperature and noise.

2. All amplifiers are "plug-in" contributing greatly to ease of installation and MAINTAINABILITY.

3. Transistors and rugged, industrial type components are used throughout. No vacuum tubes or "entertainment" type components of any kind are employed.



4. Central Control cabinet is eliminated thus reducing space requirement to a minimum.

5. ULTRA SIMPLE WIRING PLAN (no shielded cables) and UNITIZED EQUIPMENT with integral terminal facilities make for EASY LOW COST INSTALLATION and LATER EXPANSION.

* GAI-TRONICS TRANSISTORIZED COMMUNICATIONS

GAI-TRONICS
CORPORATION
Dept. C
READING, PENNA.

GAI FOUNDED 1956

A SUBSIDIARY OF GILBERT ASSOCIATES, INC. - ENGINEERS AND CONSULTANTS

GTC is extremely flexible in application. Write today for a copy of our completely illustrated, descriptive booklet and name of nearest representative.

For more facts circle 536 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

room that required both soundproofing and vibration insulation.

This was accomplished by "floating" the room, as a shell within the main building structure, on 38 neoprene mounts. Total weight supported was 24,000 lb.

The mounts, made by Hamilton Kent Manufacturing Co., rest on the main floor, but are not fastened to it in any way. They are bolted to the false flooring of the "floating" room. Each mount consists of X-shaped neoprene elements enclosed in steel cover plates. *From Elastomers Notebook, published by Elastomers Chemicals Dept., E. I. du Pont de Nemours and Co., Wilmington, Del.*

Photographs Help Maintenance

ATTACHING PHOTOGRAPHS to work instruction sheets has produced greater efficiency and economy in plant maintenance jobs at the Plastic Division, Monsanto Chemical Company, Springfield, Mass.

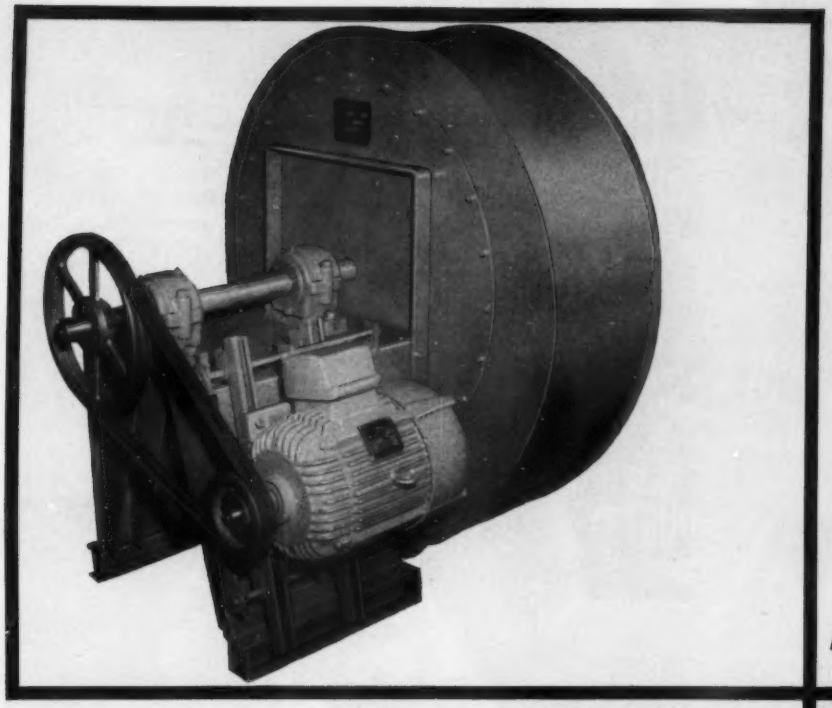
The plan, devised by Clayton Hammond, maintenance engineer at the plant, was first used on a complicated duct installation job.

Using a Polaroid Land Camera, he photographed both the ducts and the area in which they were to be installed.

This system of picturing details, parts, and places for parts, with accompanying text, proved so successful that Monsanto is using it in other plants.

Preliminary shots of the place for future operations enable the engineer to study and plan the project. The instructions with pictures are more readily understood and instantly subject to possible correction before work is started.

As a test of the system, two identical jobs at separate locations were performed by different crews. One group was provided with pictures; the other group was not. The crew aided by pictures completed their job in half the time required by the second group. *From Esso Oilways, published by Esso Standard Oil Company, New York, N. Y.*



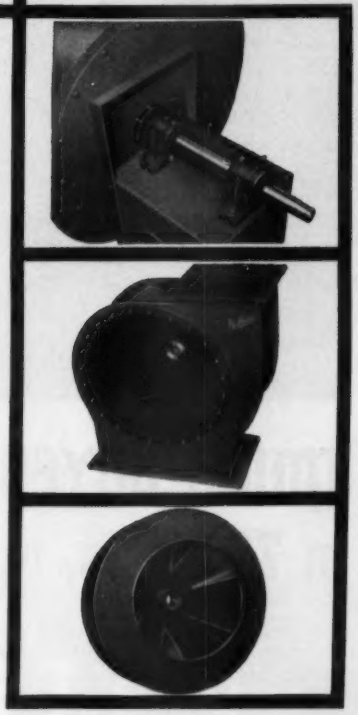
From Rugged Hot Gas Applications To Tough Materials Handling Jobs...

"BUFFALO" EXHAUSTERS CAN TAKE IT!

"Buffalo" Industrial Exhausters are ruggedly built, highly efficient heavy duty fans designed for a wide variety of applications. Husky steel plate housing is welded throughout. Adjustable to any discharge direction. Reversible for clockwise or counter-clockwise rotation. Available in numerous arrangements for many severe air and materials moving jobs. These include:

- **Moving Hot Gases** — 200° F. to 850° F. For this purpose units are equipped with heat slingers, high temperature ball bearings and/or separated steel bearing subbase.
- **Handling Corrosive Fumes.** Installations have proved that "Buffalo" Rubber-Lfned Exhausters will outlast metal fans up to twelve to one. Rubber is vulcanized directly to all metal parts exposed to acid fumes.
- **Materials Moving.** Type "MW" material wheels are available for moving emery dust, saw dust, chips, long shavings and many other types of materials.

Investigate the advantages of "Buffalo" Industrial Exhausters for your severe air or materials moving jobs. Phone your "Buffalo" engineering representative, or write for Bulletin FI-110.



Upper: Heat Slinger for cooling shaft and bearings on a "Buffalo" Hot Gas Exhauster.

Center: "Buffalo" Rubber-Lined Exhauster for corrosive fume handling.

Lower: "Buffalo" Type "MW" Material Wheel.

BUFFALO FORGE COMPANY
Buffalo, N. Y.

Buffalo Pumps Division • Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT
EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

For more facts circle 537 on Reply Card

TOUGH BUYERS demand Reznor unit heaters...
In 70 years, only 1/10 of 1% factory replacement!

When you specify heating equipment for your plant, you've got to be a "tough buyer." You've got to know that the unit heaters you order will work right to begin with, and keep on working right over the years! That's why so many plant engineers specify Reznor. There may be less expensive heaters on the market, but none with Reznor's long-term performance record: only 1/10 of 1% factory replacement in 70 years!

EVERY UNIT FLAME-TESTED . . . You get extra assurance Reznor heaters arrive in top running order. We flame-test each unit before shipment. Save the expense of bench-testing!

LONG-TERM FUEL SAVINGS . . . It's comforting to know that Reznor heaters keep your fuel bills low over the long haul. You can select a sensitive, low-voltage thermostat and controls, and two-speed fan with automatic speed selector to keep heat even, without blasts. That's why a Reznor uses less fuel to maintain proper heat.

For complete information and catalog, phone your nearby Reznor distributor, or write Dept. 91A, Reznor Manufacturing Company, Mercer, Pa.

The heating world is full of tough buyers; that's why Reznor is the world's largest selling direct-fired heater!

REZNOR HEATERS

"THE TOUGH BUYERS' LINE"

For more facts circle 538 on Reply Card

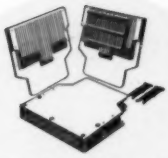
For more facts circle 539 on Reply Card →

Here's the inside story of industry's

MOST RUGGED HIGH VOLTAGE SWITCH

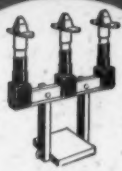
THIS SOLENOID AIR BREAK CONTACTOR IS THE HEART OF THE A-B STARTER LINE

A tremendous operating life has been built into these new A-B high voltage, air break starters by using the same simple solenoid design—with only ONE moving part—that has proved good for millions of trouble free operations in Allen-Bradley low voltage starters. A-B high voltage starters are made for all types of service and for all types of motors up to 1500 hp, 2300 v; 2500 hp, 4600 v. Send for Publication 6060, today.

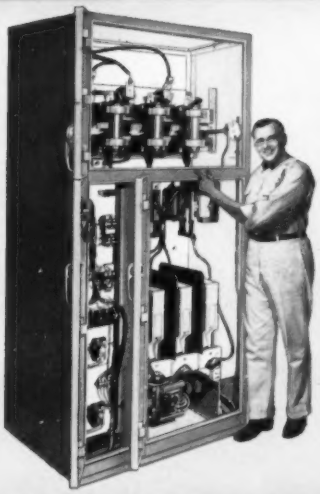


Faster Arc Suppression
New blowout design. Novel arc chutes are molded from an arc resistant material.

Double Break Contacts
Silver alloy contacts never need maintenance. Vertical motion assures uniform contact pressures.



Only One Moving Part
Simple solenoid design eliminates trouble-causing pins, pivots, and flexible jumpers.



A-B High Voltage Starter with Air Break Contactor

Bulletin 1159 high voltage air break, across-the-line induction motor starter in NEMA Type 1 enclosure. All Allen-Bradley high voltage starters are equipped with current limiting fuses with interrupting capacities of 150,000 kva at 2300 v; 250,000 kva at 4600 v.

ALLEN-BRADLEY

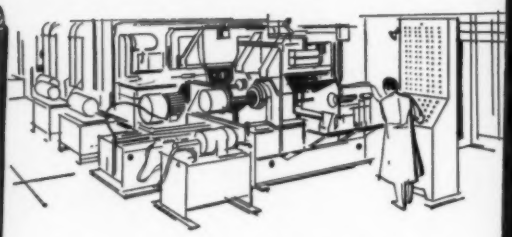
Member of NEMA

Quality Motor Control

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

AUTOMATION BEGINS HERE

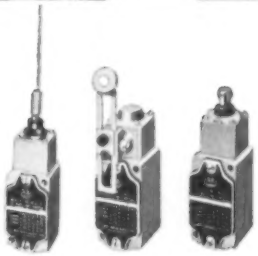
. . . Insist on Allen-Bradley accessories for continuous automatic production



In this broad line of Allen-Bradley accessories, each and every unit carries the traditional A-B trademark of *quality* that stands for trouble free operation. Rugged construction, and maintenance free, silver alloy contacts provide the reliability that is essential to the continuous operation of *your* automatic production machines.

Profit from the experience of the leading machine tool builders . . . insist on Allen-Bradley *quality* motor control *all the way!*

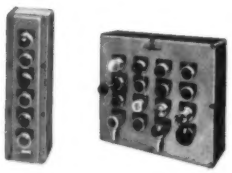
▲ Special push button panels can be assembled to your specifications.



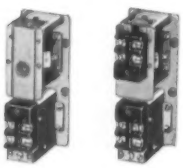
OILTIGHT LIMIT SWITCHES
Bulletin 802T with sealed heads and bodies. Various operators.

PRECISION LIMIT SWITCH
Bulletin 802 oiltight. Responds to very small operator travel.

OILTIGHT CONTROL UNITS
Bulletin 800T. Choice of push buttons, lights, and switches.



OILTIGHT CONTROL STATIONS
Bulletin 800T for up to 16 units in die cast aluminum enclosure.



PNEUMATIC TIMERS
Bulletin 849. Reliable and accurate. For on-delay or off-delay.

OILTIGHT PRESSURE CONTROL
Bulletin 836. For hydraulic systems with pressures to 5000 psi.

STANDARD DUTY PUSH BUTTONS
Bulletin 800. Up to three units, also pilot lights and switches.

FOOT SWITCH
Bulletin 805. In rugged die cast housing for toughest service.

8-59-RM

ALLEN-BRADLEY

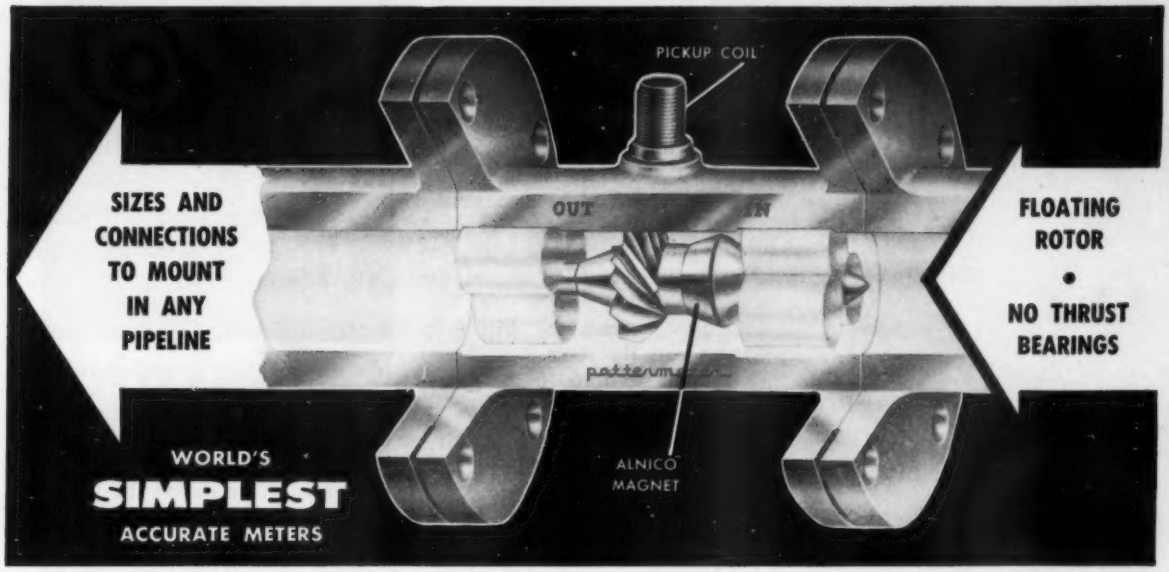
Member of NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

QUALITY MOTOR CONTROL

pottermeter BOWSER 0.1 GPM TO 40,000 GPM

ELECTRONIC TURBINE TYPE METERS



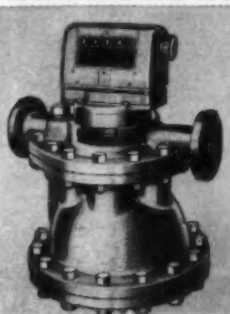
for PETROLEUMS • CHEMICALS • FOODS
PHARMACEUTICALS • INDUSTRY LIQUIDS

A magnet built into the turbine driven rotor generates electric current directly proportional to the flow rate of liquid in the pipe. This impulse is used to activate electronic control and readout equipment near the meter or at remote locations. Accurate over wide range of flow rates and pressures. Handles liquids and gases.

Flow Ranges	to 40,000 g.p.m. and more
Operating Pressures	Unlimited
Temperature Ranges	−455° F. to +1500° F.
Pressure Drop	Virtually Nil
Connections	No limitation
Construction (standard)	Type 316 stainless steel with Carpenter #20 Rotor

READOUT and CONTROL equipment as needed

Potter-Bowser engineers gladly confer with systems engineers to provide data on any application requirements.

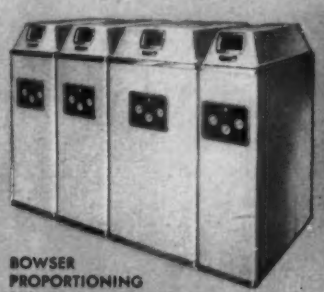


BOWSER XACTO METERS

BOWSER XACTO METERS AND PROPORTIONERS
positive-displacement piston type

Wherever mechanically driven readout and control equipment is indicated, and where positive-displacement metering is needed or costs less, Bowser Xacto Meters (leading all others in industry) are unexcelled for dependability and accuracy. Capacities: 6 GPH to 250 GPM

Xacto Meter equipped proportioners are used to blend two or more liquids in continuous flow at accuracies to ½ of 1 percent. First in lube oil blending. Bowser proportioners also handle most other liquids used by process industries.



BOWSER PROPORTIONING BLENDERS

Write For Catalog

Potter-Bowser Division BOWSER, INC. Fort Wayne, Indiana

For more facts circle 540 on Reply Card

OPERATION AND PRODUCTION —pointers for the industrial plant engineer

Edited by Vern Kempf

Half Rolls Reduce Die Changes

ALMOST ALL die changes have been eliminated on a press brake in the model shop of the Minne-

Two half rolls, on press bed, support material and pivot to assume angle determined by penetration of upper die.

apolis-Honeywell Regulator Company by using a "roll-form" die made with two ½-in.-diameter half rolls of machined, hardened and ground rod that pivot in sockets on either side of a bed block.

One 60 degree male punch forms any angle up to 60 degrees depending upon the depth of penetration which is controlled by adjusting the ram or the bed of the press brake. This method of controlling the bend also makes it easier to compensate for springback when developing a part. The material rests full against the flat surface of the half rolls throughout the forming operation and it is claimed that there are no work marks to remove.

Called the Di-Arco Rol-Form Die, the unit is available in sizes to handle materials up to ¼-in. thick and in lengths up to 12 ft.

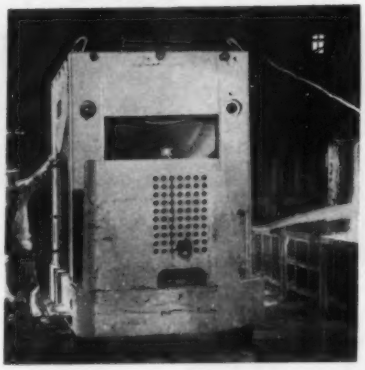
Head on Drift Aids Operator

PLANT MACHINE operators are continually using drifts to remove drills, reamers, boring bars and other tools from taper shank sockets. Addition of a round section of soft material such as brass or copper, brazed to the end of the drift, will greatly increase its versatility. This serves the dual purpose of providing a handle for removing the tools and also a hammer for tapping the tools up into the shank socket without damaging them.

After the heads become mushroomed so they cannot be used any longer, it is a simple matter to melt the brazing fillet around the head and install a new one. The head also prevents the drift from flying across the room if it should accidentally go through the socket when removing a tool.

Sand Slinger Reduces Hand Labor

MAKING BOTTOM in eight billet reheat furnaces has been greatly simplified by a mobile sand throwing machine recently installed at the Ambridge, Pa., plant of A. M. Byers Company. Designed and built by Blaw-Knox, the machine throws 1200 lb of sand per minute. Every



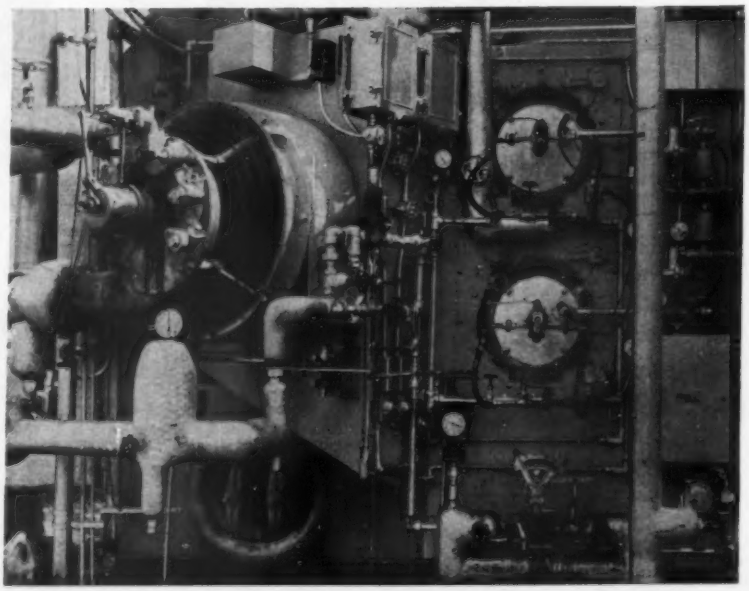
Sand slinger reduces manual shoveling.

eight hours, the machine is moved into position in front of a furnace. The heater inspects the furnace bottom and then directs the stream of sand to thin spots in the bottom that need reinforcing.

Byers engineers estimate that the machine has improved the efficiency of bottom-making by at least 50 per cent and claim the machine will

(Continued on page 58)

Turbine Blower Furnishes Exhaust Steam, Reduces Electrical Load



Turbine-driven blower, installed on this boiler at Cities Service Oil Company, Linden, N. J., is an important source of exhaust steam. Since most of the heat of the steam is recovered, forced draft is obtained at minimum cost. The turbine blower, furnished by L. J. Wing Mfg. Co., saves about 25 electrical horsepower.

quickest TO ERECT

quickest TO INSTALL

quickest TO RE-ARRANGE

quickest TO PAY FOR ITSELF

DELUXE STEEL SHELVING

quickest BECAUSE...

. . . you realized that a shipment of knockdown shelving parts has no useful value. It must first be assembled into shelving racks for storage utility. The faster these racks are erected, the lower your installation cost. So, because Deluxe steel shelving is erected the quickest, your *installed cost* is the lowest.

The film strip shows 6 engineering features of Deluxe steel shelving that promote quickest erection. Take the patented Deluxe boltless shelf bracket . . . it replaces 90% of the time-consuming nuts and bolts and allows not only quickest installation, but easy shelf adjustment.

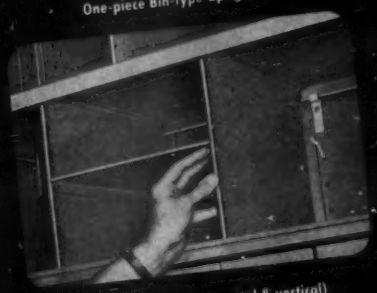
THE PROOF: At 1958 trade shows, two untrained girls erected a complete closed section of Deluxe Boltless Steel Shelving in *less than 5 minutes.*

Call your local Deluxe dealer or write for the new, complete Deluxe Shelving Catalog No. 30.

Patented Boltless Shelf Bracket

Factory Built-in Shelf Reinforcing

One-piece Bin-type Upright


Snap-in Dividers (horizontal & vertical)

Clip-on Bin Fronts

Bottom Shelf Support and Floor Angle

DELUXE METAL PRODUCTS CO. • WARREN PA.

DELUXE METAL PRODUCTS COMPANY

A DIVISION OF Royal METAL MANUFACTURING CO.

For more facts circle 541 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 56)

pay for itself in four months. It also relieves the furnace operators of the job of manually shoveling sand in the intense heat of the furnaces.

The self-driven machine, mounted on rubber tires, is equipped with a sand bin with a capacity of 120 cubic ft and a sand throwing assembly consisting of an arrangement of three pulleys and a grooved wheel over which an endless rubber-covered belt runs. Sand flows from the bin to a feed hopper in the throwing mechanism. It is directed to the grooved wheel and then to a belt moving at high speed which projects the sand in a compact stream into the furnace.

Hydraulic power for the machine is furnished by vane-type pumps driven by a diesel engine. Control of the stream and trajectory of the sand is made by adjusting the speed of the hydraulic motor. Elevation of the stream and movement to right or left are controlled through the operating handle. Adjustment of the bin gate determines the amount of sand flowing to the throwing mechanism.

Alloys Cut Spout Maintenance

USE OF an abrasive-resistant alloy steel has solved an expensive maintenance problem on spouts at Townsends, Inc., feed mill located at Millsboro, Delaware. The spouts, some of which are as long as 48 ft, carry soybeans through various processing stages to remove the oil. Adding to the wear is the fact that the beans are hot when being carried from the dryer back to the storage silos.

Jack Wessel, plant maintenance superintendent, reported that when the eight-inch diameter spouts were made of carbon steel, they had to be replaced every few months. The spouts have to be watched carefully as the slightest hole would mean the spillage of an enormous amount of beans in a short time.

Spouts made of ⅛-in.-thick Jalloy-280, furnished by Jones and Laughlin Steel Corporation, are reported to last from eight to ten times as long as those made from carbon steel. The plates are formed into tubes and the ends butted together and welded.

Jack Wessel, maintenance supt., checks the new alloy feed spout for wear.

Plug Pipe Ends Fast

By Roman Maid, Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

PRESSURE TESTING pipes of various sizes has been simplified by a hydrostatic pipe testing fixture. The new fixture does away with the need for welding studs on the pipe,

(Continued on page 60)

Lock Drive Adapter Saves Labor, Reduces Material Damage When Installing Metal Duct Work

By W. F. Tillman, Plant Engineering & Maintenance, Martin Company, Baltimore, Maryland

MOST METAL duct work installed today is joined together with a Pittsburgh lock, more commonly called a cleat. With ceiling heights 14 ft above floor level, hand setting these locks required two men. One man holds the lock in position while the other man hammers on the end of the lock to drive it onto the duct. This hand method required a cleat longer than necessary to allow for damage caused by bending and distortion during the operation.

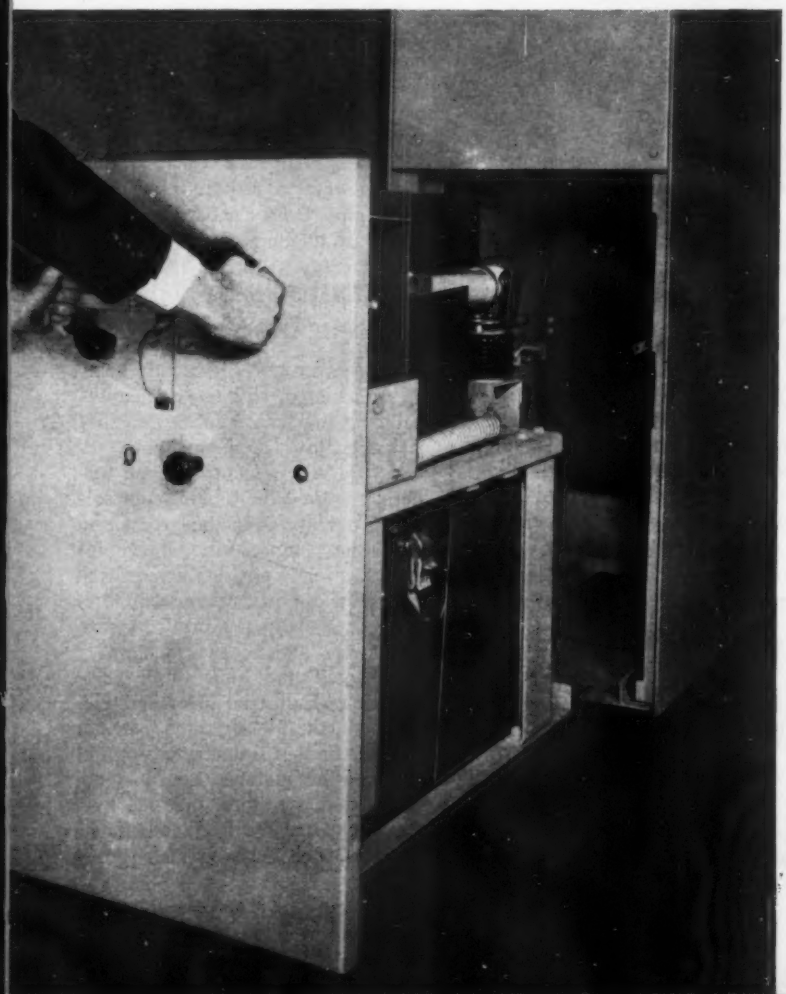
To solve this problem, we developed an adapter to fit an air impact gun. What was formerly a two-man operation can now be done by one man with less time, less fatigue and greater safety. Time studies showed that the old method took 9.96 minutes per lock while the new method took only 0.63 minutes, a savings of 9.33 minutes on each lock driven. During the past year, this method has saved approximately $2300.

The original adapter was made from scrap but after noting the great improvement and time saved, a quantity was machined to specifications and put into the hands of the sheet metal duct crew. Made from 1¾-in.-diameter tool steel, the adapter has a slot milled in the top to support the cleat during the driving operation.

Adapter for impact tool speeds driving of cleats used to join duct sections.

One man drives cleat into position on metal duct. Job formerly took two men.

Simple maintenance, inspection with General Electric ROLLOUT Switch and Fuse Equipment



It's new—General Electric Rollout Switch and Fuse Equipment. It rolls out like a file cabinet drawer—allows simple, fast inspection and maintenance. Plus—improved protection, greater safety, and installation flexibility.

For more information on this new Rollout Switch and Fuse Equipment call your nearest General Electric Apparatus Sales Office or write for bulletin GEA-6623, General Electric Company, Schenectady, New York.

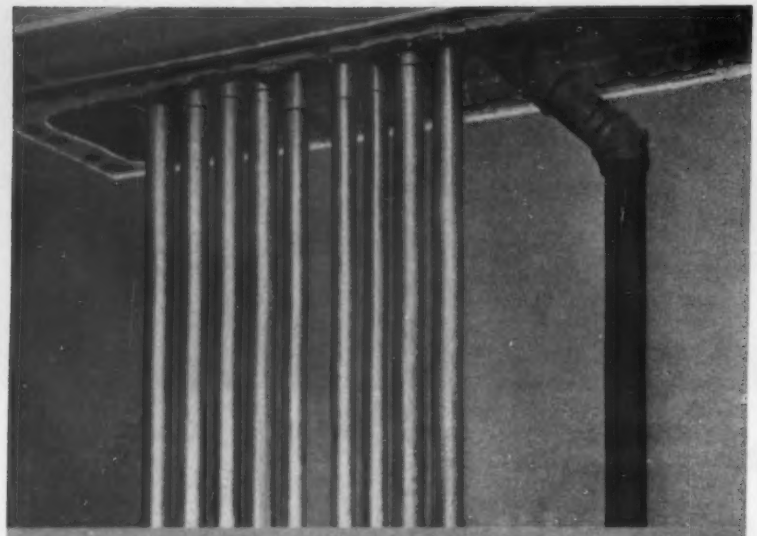
514-2

Progress Is Our Most Important Product

GENERAL ELECTRIC

NEW ROLLOUT SWITCH AND FUSE EQUIPMENT, in ratings from 2.4 kv to 13.8 kv, is applicable for both normal switching and fault current protection.

For more facts circle 542 on Reply Card



REYNOLDS ALUMINUM
Electrical Rigid Conduit

lightweight! non-corrosive!
competitive in cost!

Reynolds Aluminum Electrical Rigid Conduit cuts both installation and maintenance costs. Weighing approximately two-thirds less than steel conduit, aluminum conduit is easier to handle, faster to install. No special tools or equipment are required. Bending is easier because aluminum "sets"—less spring back.

Aluminum conduit can't rust—ever. This means no replacement worries due to rust—no periodic protective maintenance problems—no rust on walls or surrounding fixtures—no rusting of threads. Aluminum conduit is also corrosion-resistant to water, weather and most industrial atmospheres. Aluminum conduit is non-magnetic. Voltage drop is reduced—longer conduit runs or smaller conductors are possible. Aluminum conduit won't spark from accidental contact blows from hard objects—excellent for use in inflammable areas and atmospheres.

The Finest Products Made with Aluminum are made with REYNOLDS ALUMINUM

For more information
and names of Reynolds Aluminum Electrical Rigid Conduit outlets, call your nearby Reynolds Sales Office or write *Reynolds Metals Company, Box 2346-EQ, Richmond 18, Virginia.*

Also write for descriptive brochure.

Watch Reynolds TV shows—"ALL-STAR GOLF" and "ADVENTURES IN PARADISE"—ABC-TV
For more facts circle 543 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 56)

Bolts clamp fixture on pipe with plug in bore. Handle compresses the rubber against inside of pipe to provide seal.

removing the studs and redressing the pipe after completion of the tests as was previously necessary.

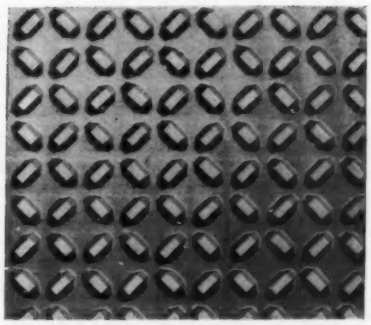
The test pipe is clamped into position and a rubber plug is positioned inside the pipe. The plug is compressed by means of a hand tightening device. Under compression the rubber expands against the inside surface of the pipe providing a hydrostatic pressure seal. A different fixture is required for each size of pipe. Bolts are used to clamp the fixture to the pipe under test.

High-Frequency Heating Cuts Brazing Time 90 Per Cent

HIGH-FREQUENCY induction heaters, associated with a new automatic brazing and soldering facility developed by Raytheon, have reduced by 90 per cent the time formerly required for brazing and soldering operations in the production of missile components. The equipment has made possible a reduction in brazing time from three minutes to 18 seconds in the production of gyroscopes and accelerometers.

Designed and built by General Electric's Industrial Heating Department, the high-frequency heater has a variable impedance output that can be matched to the load, rather than requiring that the load be matched to the fixed impedance of the heater. This variable impe-

One slip can cost more than USS Multigrip



Your workers stand—and often fall—in slippery places. Falls account for about 1 in every 5 industrial injuries.

You can eliminate many slips and falls by installing USS Multigrip Floor Plate around machines, on loading platforms, stair treads and main shop aisles.

Multigrip means safe footing wherever it's used. Hundreds of little cleats give safe traction in any direction. Water drains off quickly. Oil and grease can be easily removed with the usual cleaning compounds.

Saves money, too! Where floors take a heavy pounding from traffic, Multigrip will stand up for years. It won't splinter or crack and can be installed in extra wide plates. There's little or no maintenance.

For more information about USS Multigrip Floor Plate, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS is a registered trademark

Sold by leading distributors from coast to coast.

United States Steel Corporation – Pittsburgh
Tennessee Coal & Iron – Fairfield, Alabama
Columbia-Geneva Steel – San Francisco
United States Steel Supply – Steel Service Centers
United States Steel Export Company

United States Steel

Where dirt could mean disaster . . .

Cleaning interior of B-52 Stratofortress during assembly. Boeing Airplane Co., Seattle, Wash.

You'll find SPENCER VACUUM CLEANERS

At Boeing, vacuum is used to remove metal shavings, dirt, solder droppings and stray rivets from areas which subsequently will be covered . . . and to keep foreign particles away from delicate instruments.

And the rugged, high suction Spencer units have a second major function: maintaining general plant cleanliness.

Whatever *your* needs . . . production quality control or routine maintenance . . . there's a full powered Spencer vacuum cleaner to handle the job—*better*. Models from 1½ H.P. to 15 H.P.

Request descriptive catalog No. 155B.

The SPENCER TURBINE COMPANY
HARTFORD 6, CONNECTICUT

For more facts circle 545 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 56)

dance output has several practical advantages.

In designing the induction heating coils used in the fixtures, it is no longer necessary to compromise between a coil which gives the desired heat pattern and one which matches the induction heater. Instead, the coil is designed for optimum heat pattern and the impedance of the induction heater is quickly matched to the load by means of a dial control.

Machine Speeds Welding of Aluminum Pipe

Automatic pipe welding machine, designed and developed by the Aluminum Company of America, is capable of producing sound welds with full penetration without the use of back-up rings. The high-speed unit completes a pass on a four-inch pipe in 11 seconds and can process all tubular products with diameters from four to 11 in.

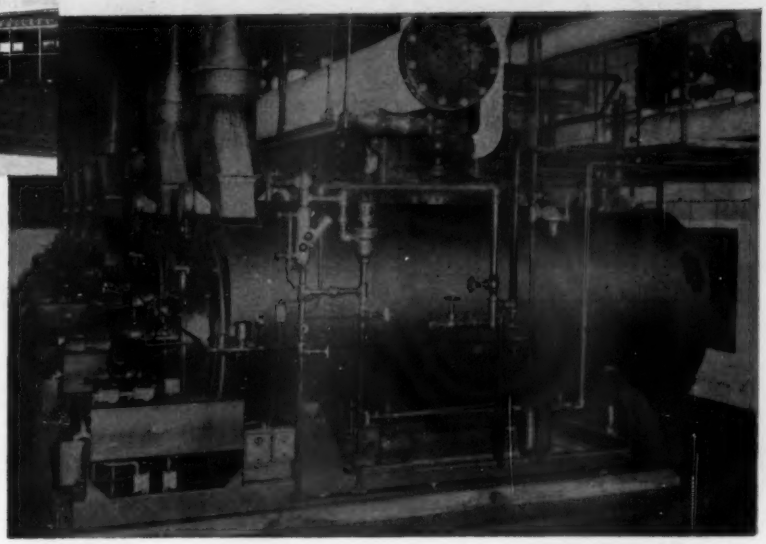
Cool Air Improves Operations

RED-HOT INGOTS pass directly under the operator's compartment on a blooming mill at the Ford Motor Company's Steel Division operation in Dearborn, Michigan. While one ingot is being reduced into its new shape in front of the pulpit, another is delivered to a ready position in back of the pulpit. The compartment is thus exposed to extreme heat from two directions.

Temperature effect is further magnified by the need for large windows front and rear to provide the required wide-angle visibility for the operators. Operator comfort

Never more steam than you can use . . .
never less steam than you should have!

One of the largest producers of graders, roadscrapers and rolling equipment, Galion Iron Works & Manufacturing Co., has six 125 HP Cyclotherms now operating, plans to add a seventh and eighth as steam demands increase. Automatic operation has been the big factor in helping Cyclotherm make the grade with the graders!



Like GALION ESTABLISHED 1907 Iron Works, plan for tomorrow with

CYCLOTHERM!

With Cyclotherm Steam and Hot Water Generators, you buy steam capacity as you use it. No investment in excess capacity. No steam shortage with an outgrown boiler.

Cyclotherms give flexible capacity. You can add 518 lbs. of steam per hr. with a 15 HP Cyclotherm, or 25,875 lbs. per hr. with a 750 HP Cyclotherm. And there are 16 intermediate sizes to choose from.

AUTOMATIC OPERATION

Cyclotherms operate with automatic efficiency. On 15 to 60 HP units, burner automatically shuts down when steam demands are satisfied, automatically turns on when more steam is needed. On 80 to 750 HP units, modulation controls regulate firing rate from 30% to 100% of rated capacity, without loss of efficiency. Operation stops automatically if firing sequence is interrupted and unit "fails safe."

BUILT TOGETHER TO WORK TOGETHER

Cyclotherm burner and boiler are built together to work together — one manufacturing responsibility back of the entire equipment. Units are fire-tested at factory, shipped ready to operate. Cyclotherms are up to 1/3 smaller than other package boilers of same capacity. Installation is easy—no costly stack, no excavation, no foundation.

"CYCLONIC COMBUSTION"

"Cyclonic Combustion"—Cyclotherm's patented combustion principle—guarantees a minimum of 80% efficiency, meets all state requirements, conforms to A.S.M.E. and National Board standards, carries Underwriters' Laboratories label. Steam Generators from 15 HP to 750 HP, burn oil and/or gas. Hot Water generators in 10 capacities, from 670, 000 BTU per hr. to 6,700,000 BTU per hr.

YEARS AHEAD IN STEAM & HOT WATER GENERATION
CYCLOTHERM®
STEAM AND HOT WATER GENERATORS

A Division of National-U. S. Radiator Corp. • 54 E. First St., Oswego, N. Y.

Clip to Your Letterhead

54

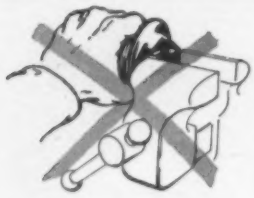
Please send me your booklet *Cyclotherm Cyclonic Combustion*, also rotogravure copy of *Cyclotherm Sales Steam* with illustrations and descriptions of Cyclotherm installations.

For more facts circle 546 on Reply Card

Now . . . from Barnes & Jones . . . the BIGGEST DROP in Steam Trap Maintenance in 50 Years!

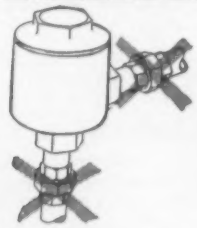
No parts — no assembly.

Barnes & Jones has been recognized for over half a century as a leader in thermostatic traps for the heating trade. Now — the same basic cage unit feature that revolutionized radiator traps thirty years ago is available for high pressure process steam applications.



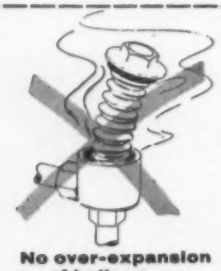
No special tools or shop required.

Now — costly, time-consuming steam trap repairs are outmoded. For with this new B-J Cage Unit replacement, you simply drop a complete new interior into the trap and it's new again. And if steam trap maintenance is a bugaboo with you — it's the best and biggest drop you can make.



No need of unions.

Also — Barnes & Jones Cage Unit interiors are available to renew other makes of industrial traps.



No over-expansion of bellows.

If you're interested in saving steam, cutting repair and maintenance time and improving trapping efficiency, write today for "The Steam Trap Primer". You'll see the 'hows' and 'whys' of steam trap performances. And perhaps you'll see how B-J high pressure traps and cage units can end your steam trap problems.

Be Wise . . . Be Sure . . . B-J

Barnes & Jones, Inc.
34 Crafts Street
Boston 60, Massachusetts

For more facts circle 547 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 56)

Air conditioner in operator's compartment keeps comfortable temperature.

in a work station such as this is reflected in the quality of the steel produced.

A packaged air conditioner was installed to maintain comfortable temperature levels in the operators compartment. Furnished by American Blower, the unit is equipped with a plenum take-off to a short overhead duct.

Fixture Doubles Production

APPLICATION of a simple ratchet positioning fixture on a spot welding machine has resulted in a 100 per cent increase in production at the Allied Control Company, Inc., Plantsville, Conn. The time-saving

Linked to up and down motion of welder, fixture positions parts accurately.

NEW!

HONEYWELL INDICATING TEMPERATURE CONTROLLER

. . . designed for industrial applications

The new Honeywell T654A is a rugged, dependable, yet modestly priced indicating temperature controller designed specifically for industrial use. It includes these features:

- Indicating and control setting dials clearly visible.
- Set point changed by turning knob on front of case.
- Even graduations in a variety of ranges.
- Sensitive, liquid-filled thermal system.
- Complete case and tubing compensation for ambient temperature.
- Armored capillary tubing.
- MICRO SWITCH* SPDT narrow differential snap switch.

Get complete details from your nearby Honeywell field engineer.

Call him today . . . he's as near as your phone.
MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

*Trademark

Honeywell

First in Control

WHEELABRATOR® DUSTUBE® COLLECTORS provide complete, economical dust control

No plant is too big, no problem too tough, no air pollution code too strict for Wheelabrator dust and fume control engineering to solve the problem at minimum cost.

In complete plant ventilation, for example, Wheelabrator Dustube systems are successfully handling as much as 2,500,000 c.f.m, as in the installation at the 12-story Jeffrey Mill of Johns-Manville Co., Ltd., Asbestos, Quebec. And there are hundreds of other installations, large and small, in which Wheelabrator Dustube systems regularly perform with 99+ % efficiency.

Wheelabrator takes a "wide-angle" view of air pollution problems, to solve the total problem, not merely shift it to another area. There's no cost or obligation for consultation with a Wheelabrator dust and fume engineer. For complete information write for Catalog 372C. Wheelabrator Corporation, Dust & Fume Division, 859 S. Byrkit Street, Mishawaka, Indiana, Canadian Division, P. O. Box 490, Scarborough, Ontario.

WHEELABRATOR
DUST AND FUME CONTROL

For more facts circle 549 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 56)

fixture also improves product quality by holding spot weld tolerances to within 0.001 inch.

Previously, four separate hand operations were needed to line up shoulders of a relay mounting ring for spot welding to a housing. Allied control engineers designed a special 90 degree ratchet fixture that is mechanically linked to the 15 kva spot welder. Up and down strokes that bring the spot welder into operation now automatically rotate and position the assembly for each of four spot welds.

Tape Checks Food Sterilization

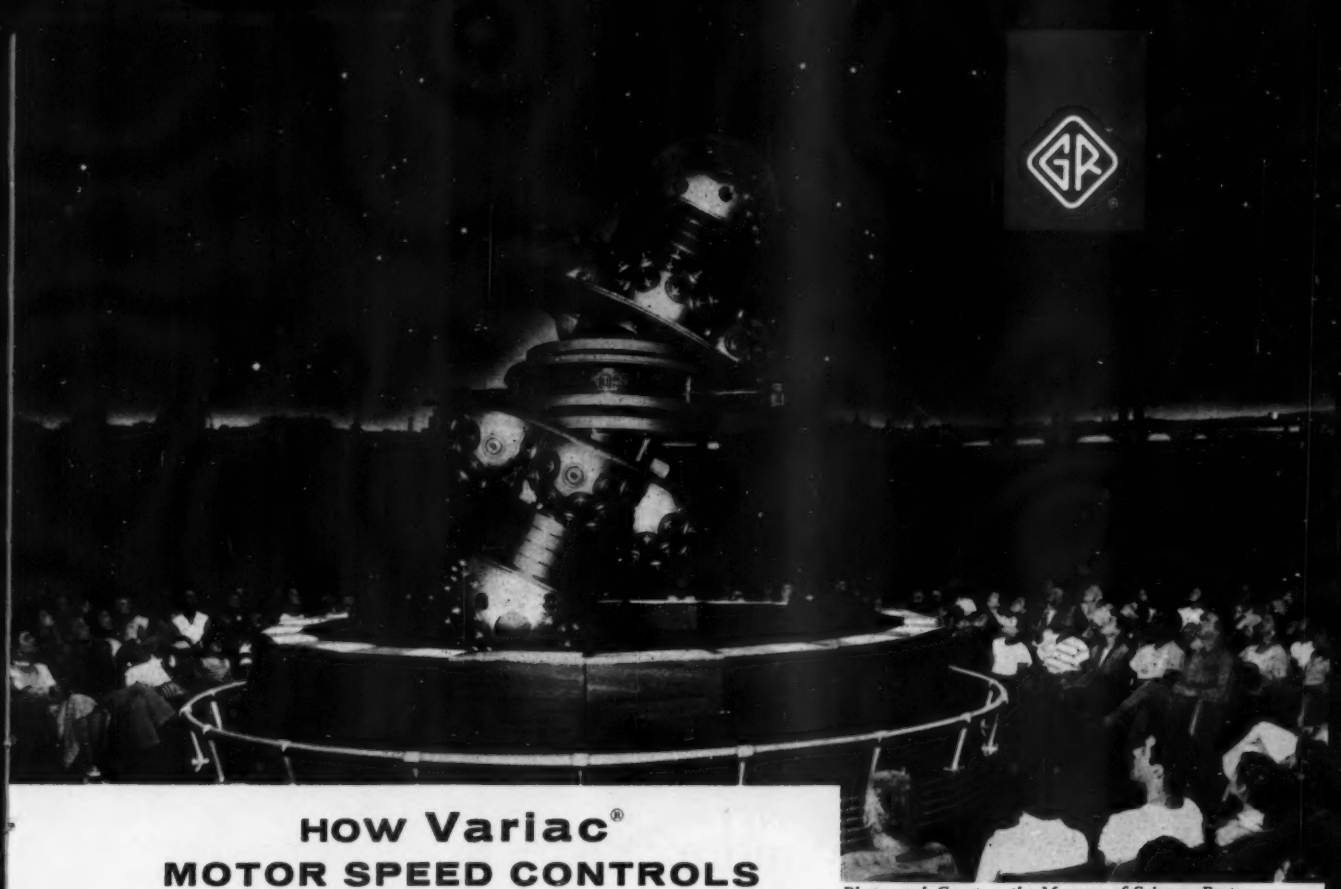
A POSITIVE CHECK against improper processing is now being used at the Larsen Canning Company,

Dark brown lines on tape from test can indicates sterilization has occurred.

Green Bay, Wisconsin, to make sure each can of food has been properly sterilized. This is accomplished with a pressure-sensitive tape which is applied to test cans in a batch ready for the retort.

Furnished by the Minnesota Mining and Manufacturing Company, the tape automatically shows dark brown lines when it is exposed to 240 F or more of uniform moist steam-heat.

Application of the tape, called Autoclave Tape no. 222, to various cans in the retort is also considered an effective check for determining the existence of dry air pockets.



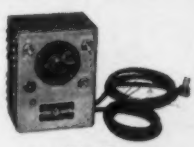
HOW Variac® MOTOR SPEED CONTROLS HELP KEEP THE SKY IN PLACE

Photograph Courtesy the Museum of Science, Boston

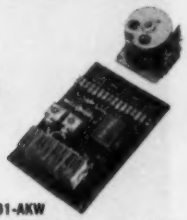
The nation's newest and most advanced planetarium at the Museum of Science in Boston provides visitors with the most realistic star show yet devised by man. Designed and developed by the Korkosz brothers of Springfield, Massachusetts, the projector is capable of reproducing 9,600 first- to sixth-magnitude stars, each correct in brightness to one-tenth magnitude.* Viewers see the stars just as they appear out-of-doors, even to their familiar twinkle.

G-R Variac Motor Speed Controls position the massive three-ton projector unerringly. In this way, the sky can be adjusted to appear as seen from any spot on earth and at any time of day. Variac Motor Speed Controls were picked for this application for a number of reasons: They allow the motor to deliver maximum torque at any speed. Effective filtering of ripple currents by the Control prevents torque pulsations in the motor's output. High starting torque permits quick motor starts even under full load conditions. The Control uses no electronic tubes, insuring instant warmup and minimum maintenance. The motor can be stopped or reversed with one switch . . . dynamic braking is standard on all controls above 1/15 hp. Good regulation plus the use of a Variac continuously-adjustable autotransformer in the control make for wide-range and smo-o-o-th speed variation.

**Intensity controlled by Variac® continuously-adjustable autotransformers.*



Type 1701-AK
1/15 hp capacity, **$85**



Type 1701-AKW
basic model 1/15 hp capacity, **$72**

Ten models are available for controlling d-c motors from a-c lines. Ratings range from 1/15 hp to 3/4 hp. Choice of either cabinet model, or basic stripped-down design for use as original equipment by machinery manufacturers.

Motors available
Quantity discounts apply

Type 1702-A
3/4 hp capacity, **$255**

Type 1702-BW
basic model
3/4 hp capacity, **$215**

Write for complete information

GENERAL RADIO COMPANY

WEST CONCORD, MASSACHUSETTS

FIRST
Broadcast Station
Crystal Oscillator
1922

NEW YORK, WOrth 4-2722 Ridgefield, WHitney 3-3140	CHICAGO Oak Park VIllage 8-9400	PHILADELPHIA Abington HAncock 4-7419	WASHINGTON, D.C. Silver Spring JUniper 5-1088	SAN FRANCISCO Los Altos WHitecliff 8-8233	LOS ANGELES Los Angeles HOllywood 9-6201	IN CANADA Toronto CHerry 6-2171

For more facts circle 550 on Reply Card

NOW! *One new, brighter 40-watt lamp does the*

2800

NEW "UNIVERSAL" PREHEAT-RAPID START LAMP

YOU GET — more light per dollar — FROM WESTINGHOUSE

3200 LUMENS
(cool white)

In the highest-rated 40-watt lamp

Get 21% more light using your present rapid start fixtures . . . 3310 lumens in white and warm white! The new "Crestline" is the only fluorescent with no "lazy ends"—even the bases let light through (optional at slight extra cost). Life rated at 7500 hours at 3 hours per start.

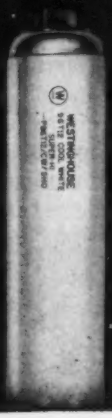
9000 LUMENS
(cool white)

in the brightest 96" High Output lamp you can buy

Light output improved 23% over present H.O. type (High Output) lamps to make this the most economical 96" H.O. type lamp ever developed for application where high output lamps are used . . . 9300 lumens in white and warm white. This brightest of all 96" H.O. type fluorescents is rated at 7500 hours' life—more than 2 years' use in the average installation—and they're designed to operate on present 96" H.O. ballasts.

15,000 LUMENS

in the economical 96-in. (Super-Hi™) type lamp



New ballast equipment and improvements in lamp design have increased the light output of this single 8-foot S.H.O. lamp to 2½ times that of ordinary lamps. Smooth, tubular surface can't accumulate dust and cut down light. Rated at 7500 hours' life.

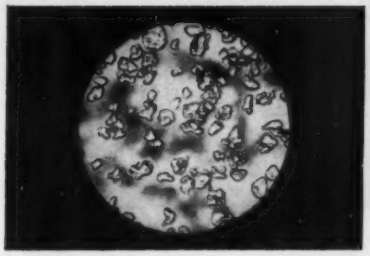
job that two different types have been doing!

LUMENS
(COOL WHITE)

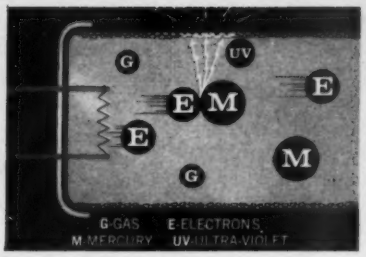
Simplify stocking, ordering and maintenance by specifying this one 40-watt fluorescent lamp for the job that two different types have been doing! The new Westinghouse "Universal" lamp can be used on either your present rapid start or preheat circuits with no loss in lumen output. You'll save storage space; save time and error in maintenance by stocking this one lamp.

Whether you're planning or expanding, you can use this lamp in your new fixtures, as well as in your existing ones. And here's the best news of all: light output has been increased to 2800 lumens, while the list price has been *reduced* to only $1.25—5¢ less than old style rapid start lamps!

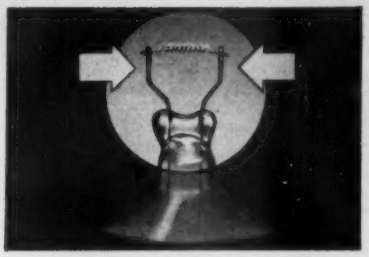
Only Westinghouse brings you these 6 LIGHT-BOOSTING ADVANCES



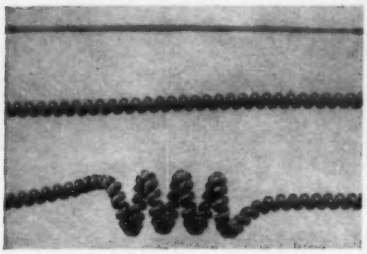
Ultralume™ Phosphors: Westinghouse research has proved that the size of the individual phosphor particles which coat the inside of a fluorescent lamp have a direct effect on the amount of light given off. Now, a new and exclusive Westinghouse process selects the right particle size for more efficient light-producing phosphors.



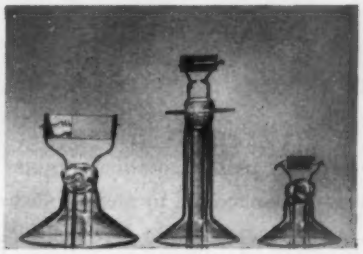
Mixed Gases: All fluorescent lamps contain mercury and gases. The gases serve as conductors until the mercury is vaporized. These gases and mercury vapor then convert electricity into ultra-violet radiation, which causes the phosphors to "fluoresce." Westinghouse uses the right mixture and pressure for each type of fluorescent lamp.



Plated Leads: The electron bombardment inside a fluorescent tube eventually causes particles of the metal supports and leads to sputter off causing "end blackening." To prevent this, Westinghouse plates the lead wires with super-hard chrome-vanadium. Result: tubes that *stay* brighter, end to end.



Triple Coiled Electrodes: Westinghouse uses triple wound electrode coils to hold the right amount of emission material. This carefully measured amount is heated quickly and adequately protected from bombardment to insure long life and trouble-free starting.



"Custom" Anodes: Anodes act as buffers and prevent excessive "sputtering" of emission material from the electrodes. Since the electrical characteristics are different for each type of fluorescent lamp, Westinghouse anodes are especially engineered to fit the electrical requirements of each type of lamp.

Silicone "Raincoats": In high-humidity areas, moisture can collect on the exterior surface of the lamp and prevent it from starting. To protect against moisture accumulation, Westinghouse fluorescents are given a special Silicone coating, or "raincoat," which disperses this film into harmless droplets.

CONTACT YOUR LOCAL WESTINGHOUSE LAMP AGENT, OR WESTINGHOUSE LAMP DIVISION, BLOOMFIELD, N. J.

These new fluorescent advances are made possible by the same Westinghouse Research which brought you . . .

NEW SHAPE . . . NEW LIGHT . . . WESTINGHOUSE EYE SAVING WHITE BULBS . . . *Another reason why—*

YOU CAN BE SURE... IF IT'S Westinghouse

For more facts circle 551 on Reply Card

no slip...no slide...no skid ...with A.W. ALGRIP abrasive flooring

Be sure of safe footing at the hazardous places in your plant. You know where they are . . . wherever slipping, sliding and skidding occur. Now your slippery spots can be your safest spots . . . with A. W. ALGRIP flooring.

Here's a rolled steel floor plate that's made by an Alan Wood patented process in which an abrasive is embedded to a controlled depth . . . becoming an integral part of the steel plate, to give you lasting safety.

A. W. ALGRIP can be used as independent flooring . . . or as flooring overlay. Put your plant on a safe footing, with A. W. ALGRIP . . . Approved for Safety by Underwriters' Laboratories. Write for Bulletin AL-N4.

ALAN WOOD STEEL COMPANY

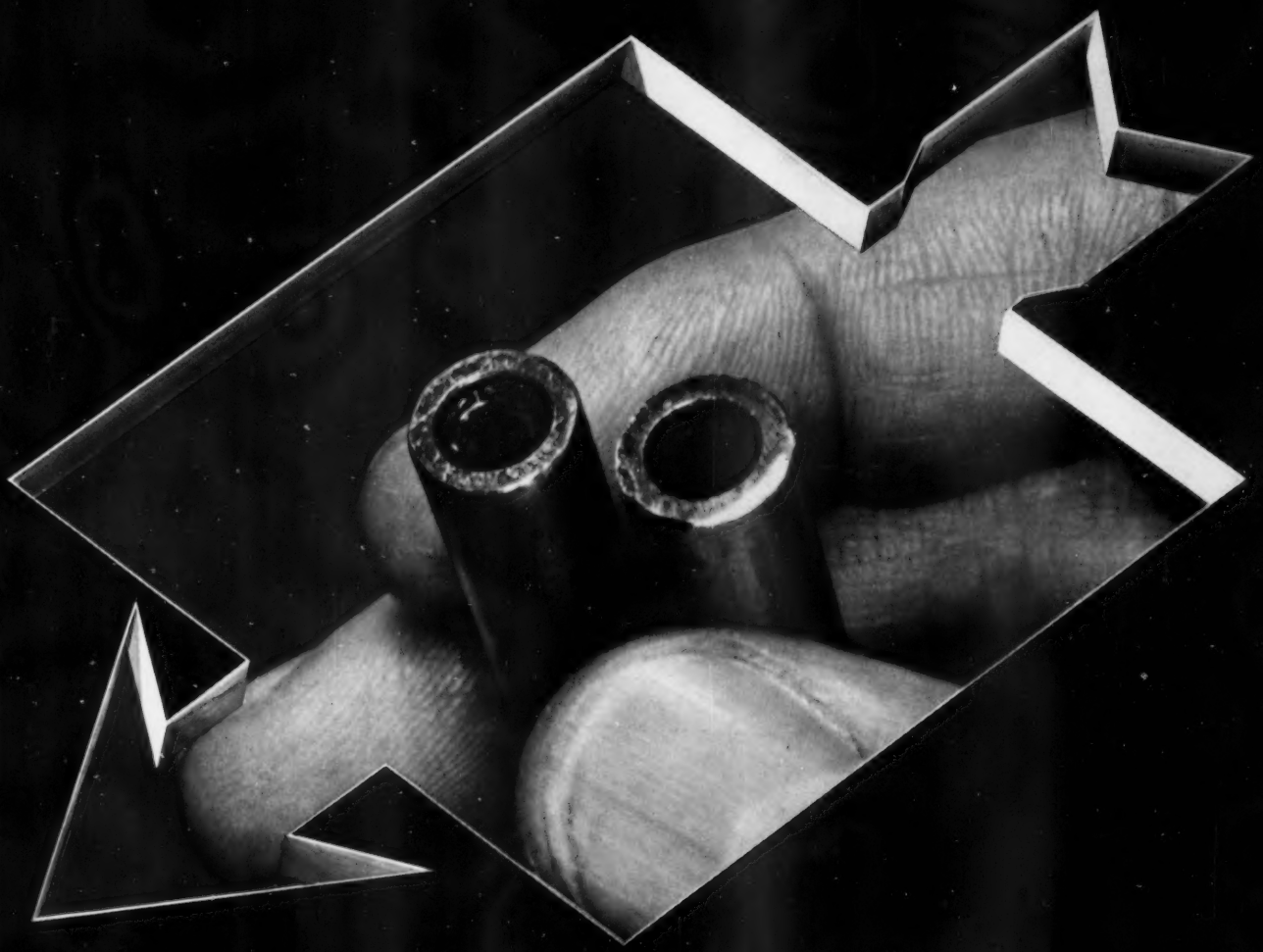
CONSHOHOCKEN, PA.

DISTRICT OFFICES: Philadelphia • New York • Los Angeles • Boston • REPRESENTATIVES: Atlanta • Buffalo Cincinnati • Cleveland • Detroit • Houston • Pittsburgh • Richmond • St. Paul • San Francisco • Seattle • Montreal, Toronto and Vancouver, Canada—A. C. Leslie & Co., Ltd.

For more facts circle 552 on Reply Card

For more facts circle 553 on Reply Card

Quality–the best economy of all



Two oils...two lines...one clogged...one cleaned

A Sunvis 700 oil and a regular oil were run through two equally clogged hydraulic lines. The regular oil couldn't remove the sludge. The Sunvis 700 oil cleaned its line thoroughly. That's one job it's made for . . . to clean out sludge deposits in hydraulic lines while it transmits power.

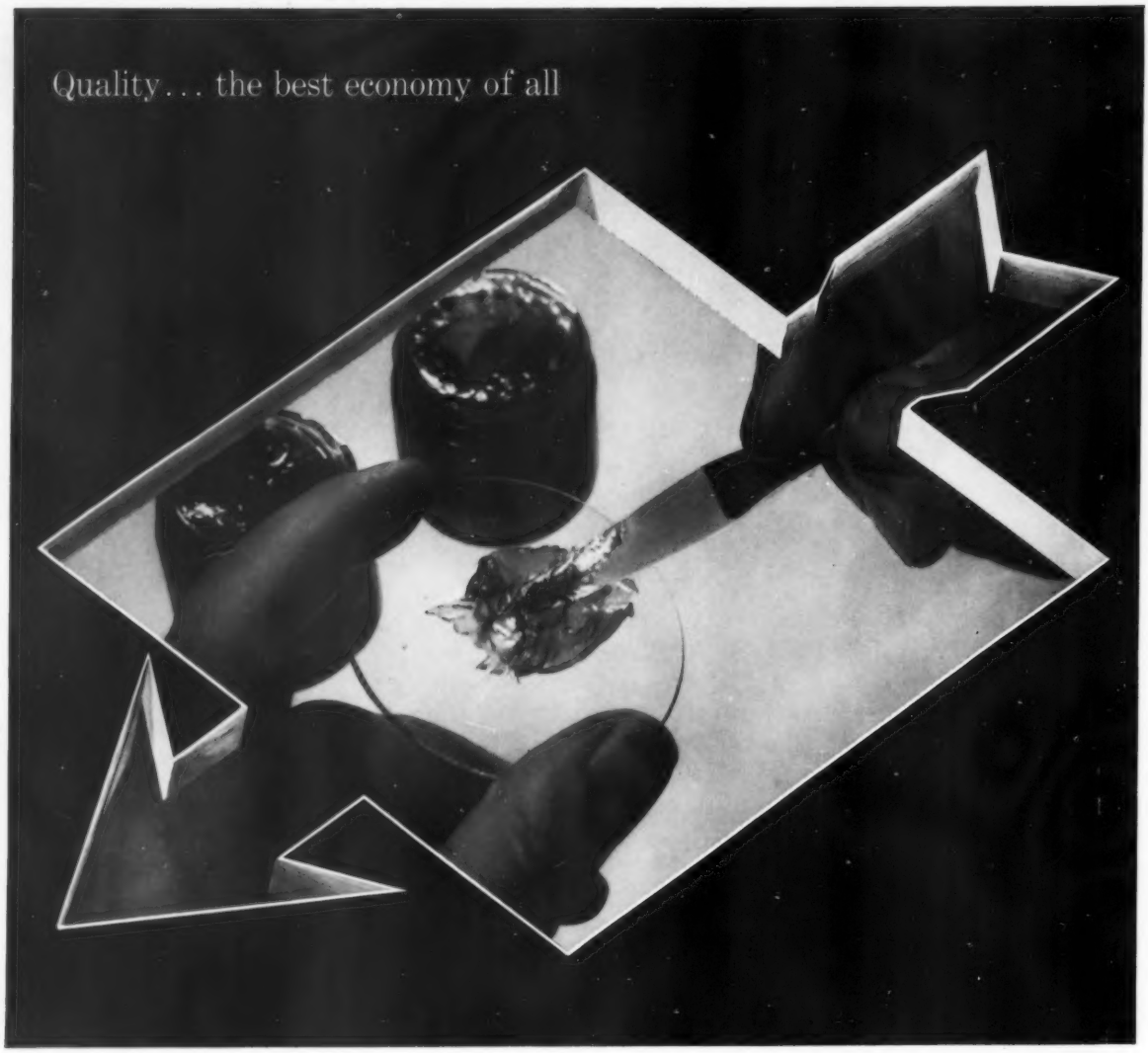
With a Sunvis 700 oil—like every Sunoco oil—you enjoy the best economy of all: the economy of quality. A Sunvis 700 oil lasts longer. The machinery it protects lasts longer. It prevents rust . . . ups output by reducing downtime.

FREE Trouble-Shooting Chart will help you spot and cure common hydraulic system troubles. For your copy, write to:

Sun Oil Company, Philadelphia 3, Pa., Department I-12.

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

SUNOCO

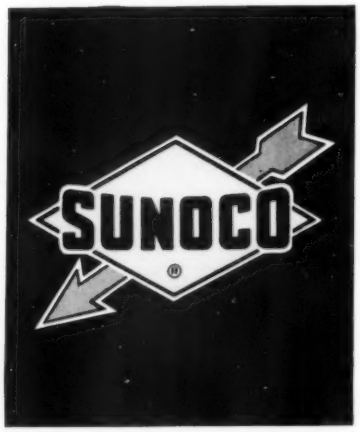


It's a multipurpose grease . . . but *how* multipurpose?

You can't "feel" the answer. Any "multipurpose" grease you buy is a compromise. Lubrication engineers say it *can't possibly be* the best lubricant both for high speeds and low loads . . . and for low speeds and heavy loads. It's *got to be* somewhere in between, so that it can do both jobs fairly well.

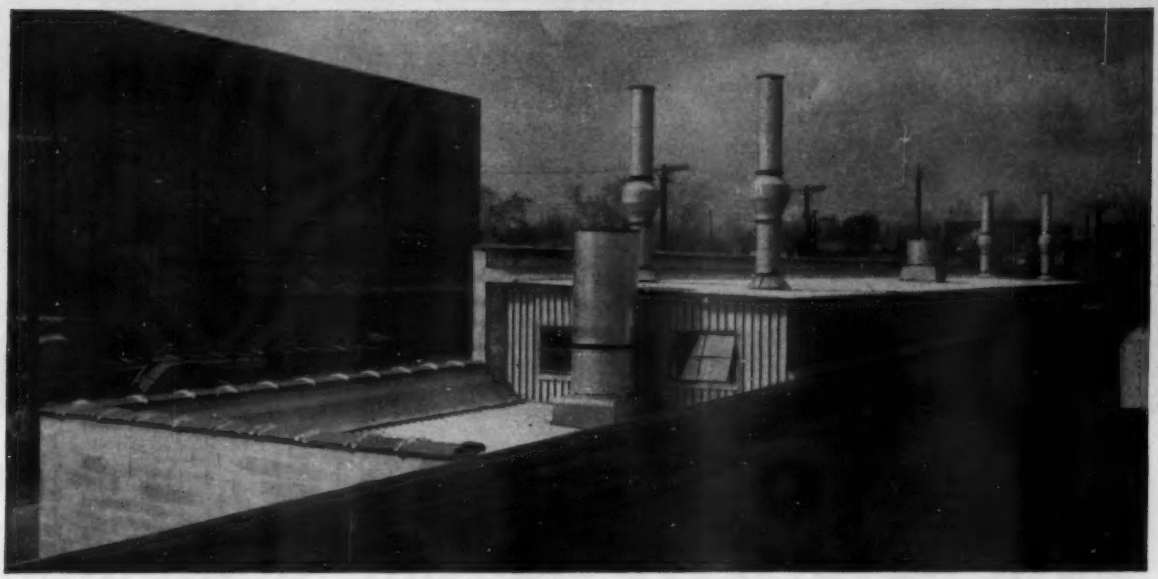
What you should do is decide on *which* multipurpose grease is best for you. This is a decision for an expert team—you and your Sun representative—because you have to consider many variables.

We feel, justifiably, that one of Sun's Prestige Multipurpose Greases is designed with that wide range of applications you're looking for. They last longer under pressure, water, heat, and other abuses. They bear investigation. To start enjoying the real economy of quality, call that Sun man today—or write direct to SUN OIL COMPANY, *Philadelphia 3, Pa. Dept. PY-10. In Canada: Sun Oil Company Limited, Toronto and Montreal.*

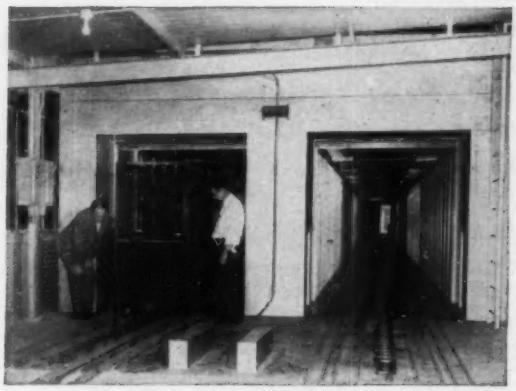


MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

FINISHING SYSTEMS...



Stout Sign Company Eliminates Production Bottleneck with Conveyorized Paint Baking Equipment!



In the two ovens above, installed at Stout Sign Company, St. Louis, Mo., uniform drying is accomplished by four recirculating zones in each oven. Hot air is forced across the oven by pressure and suction controlled by banks of narrow, vertical apertures in the oven walls which extend from floor to ceiling. These narrow apertures assure even distribution of hot recirculated air, and cause the air to flow horizontally through the sign racks and over the work. The direction of air flow is reversed in each successive zone. Air is recirculated at the rate of 13 oven volumes per minute.

Mahon engineers were called in to solve a paint-baking bottleneck in the production of metal signs painted with the silk screen process. This application process necessitates stacking freshly painted signs in a horizontal position, with only two inches of air space between, in specially built racks. Stout Signs had previously been baked in this manner in batch-type ovens.

The solution arrived at by Mahon engineers was two parallel tunnel-type, conveyorized ovens built as a single unit adjacent to the plant. Each oven was provided with independent temperature and conveyor speed controls and was designed to utilize existing sign drying racks which were modified and adapted to conveyor use.

The Stout Sign Company is now able to control temperature and time-length of the drying and baking process to meet any finish requirements . . . they are relieved of much manhandling of racks, and are free from excessive paint fumes and dust and lint troubles; production flows smoothly, and the quality of finish on their product is vastly improved.

The enthusiasm of a satisfied customer is best evidenced by the following excerpt from a letter recently received from Stout Sign Company: "Let me congratulate you and your entire engineering staff on an accomplishment beyond our expectations."

When you consider new finishing equipment or processing equipment of any type, you, too, will want to discuss your requirements with Mahon engineers.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Offices in Detroit, New York, Chicago, Los Angeles and San Francisco

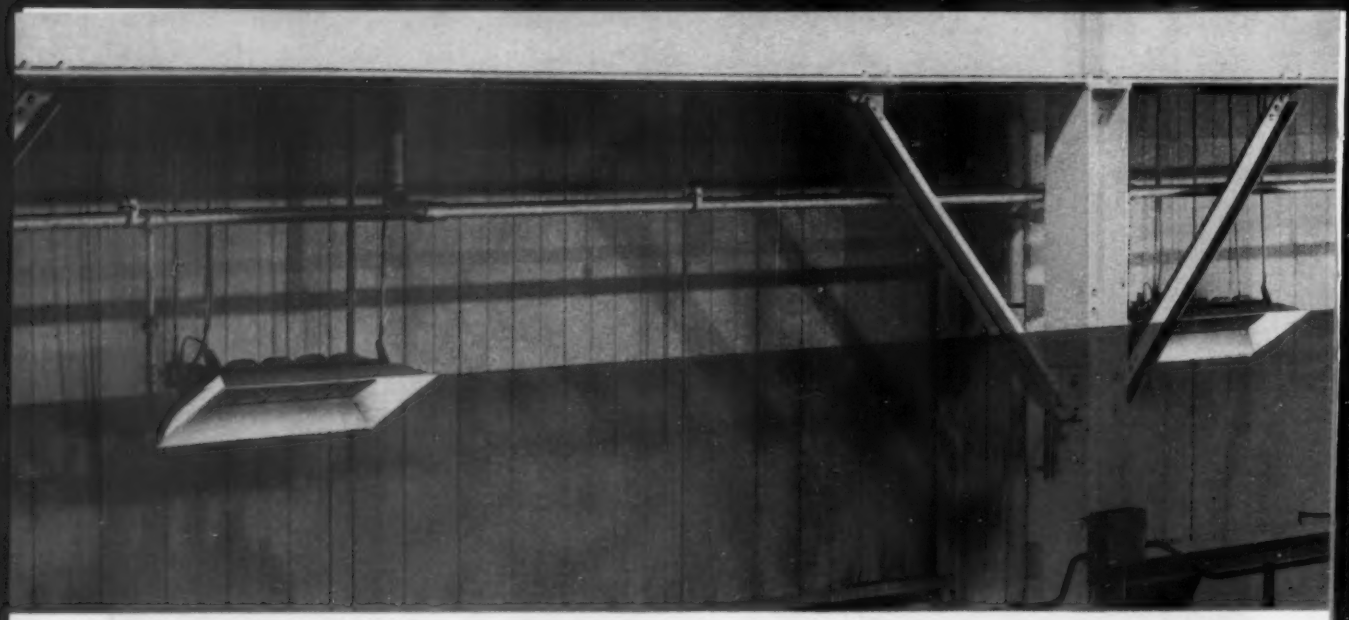
Engineers and Manufacturers of Complete Conveyorized Finishing Systems: Metal Parts Washers, Metal Cleaning and Rust Proofing Machines, Conveyorized Cleaning and Pickling Machines; Dry-Off Ovens, Spray Booths, Electrostatic Spray Enclosures, Flow Coaters, Dip Coaters, Finish Baking Ovens, and Paint Stripping Equipment; Core Ovens, Soldering Ovens, Dehydrating Ovens, Heat Treating and Quenching Equipment for Aluminum and Magnesium; Dust and Fume Control Installations, and Many Other Units of Special Plant and Production Processing Equipment.

See Sweet's Plant Engineering File for Information and Representative Installations, or Write for Catalogue A-659

. . . the **EXPERIENCE** that goes into the **PLANNING** and **ENGINEERING** of **MAHON EQUIPMENT** is the item of **GREATEST VALUE to YOU!**

MAHON

For more facts circle 555 on Reply Card



with *Perfection Schwank* INFRA-RED Gas Heaters

"We never give heating equipment

. . . "and why should we," says L. W. Morgan, Plant Engineer at The Yoder Company's new metal-forming machinery plant in Cleveland, Ohio. "We have no blowers, ducts or heat exchangers to worry about. What's more, our employees have never before enjoyed such perfect working comfort . . . even when outside temperatures drop below zero."

"There are no disturbing drafts and we've eliminated the 4 or 5 hour warm-up period required by other systems to bring plant temperatures up to comfort level. Also, machinery and tools are always warm to the touch. We plan to use these same heaters in our next plant expansion."

Comments such as this sum up the feelings of over 15,000 enthusiastic users of Perfection Schwank Infra-Red Gas Heaters. *Call, Write or Wire for complete information and literature.*

MATCH THESE FACTS WITH *ANY* OTHER HEATING SYSTEM!

Building Size: 100′ x 380′ x 40′, plus 30′ x 60′ x 18′ truck dock, plus 40′ x 40′ x 18′ compressor room. A total of 1,581,000 cu. ft.

Construction: Walls: Stainless steel sandwich 1½″ insulation. Roof: 4″ pre-cast concrete, ¾″ rigid insulation.

Heater Mounting Heights: 99 units installed at 16′—18′—40′.

Temperature: 68° constant

Degree Days (63° Base)**:** 5455

Estimated Heat Loss (computed on ASHRAE basis): 3,740,000 BTU per hour

Installed BTU*: 4,488,000

Period of Study: September 16, 1958 to May 10, 1959

Fuel Consumption (Infra-Red): 5,477 Mcu.ft. of natural gas (1000 BTU/cu.ft.) for a total of $3,722 for the period studied.

Electrical Cost: (estimated for Infra-Red): $15.00

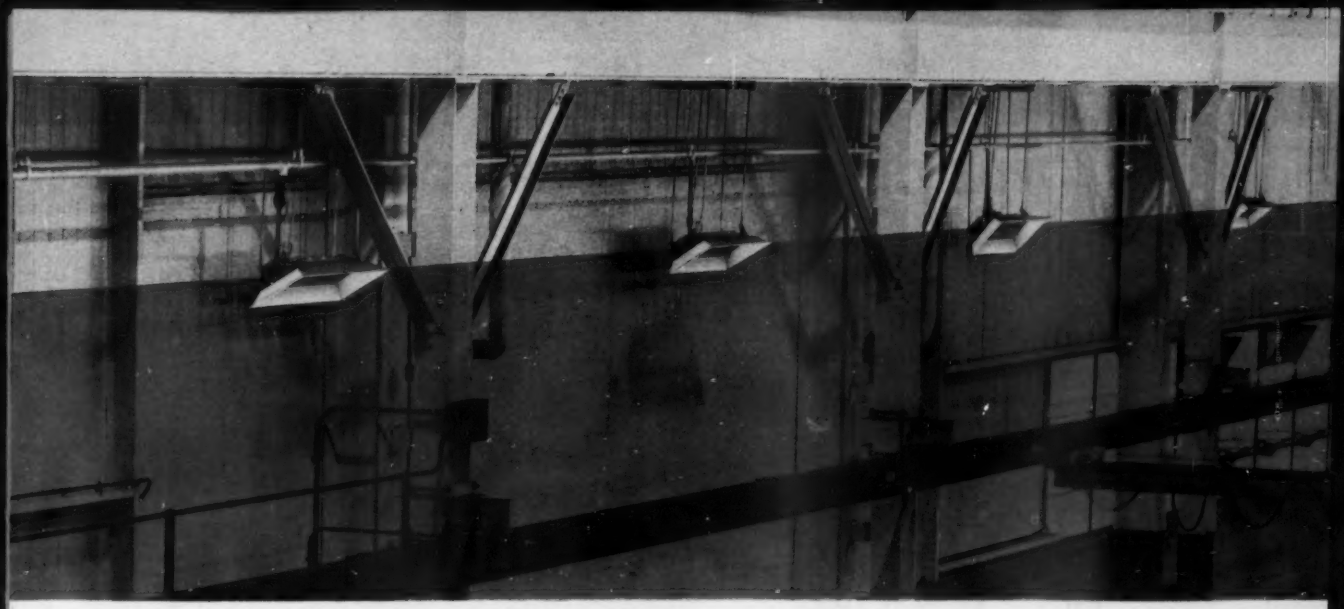
Probable Fuel Consumption (ASHRAE—efficiency of 80%): 8,440 Mcu.ft. of natural gas (1000 BTU/cu.ft.)

**Input equivalent to that required with an 80% efficient heating system. Note actual efficiencies.*

Perfection industries **1135 Ivanhoe Rd., Cleveland 10, Ohio**

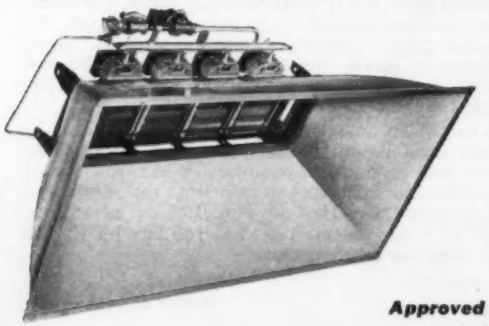
division of **Hupp Corporation**/ licensee of **American Infra-Red Radiant Co.**

Under Schwank U.S. Patents 2,775,294 and 2,870,830 and pending applications



maintenance a second thought"

Partial view of The Yoder Company's new plant, designed by McGeorge-Hargett & Associates, Cleveland, Ohio.



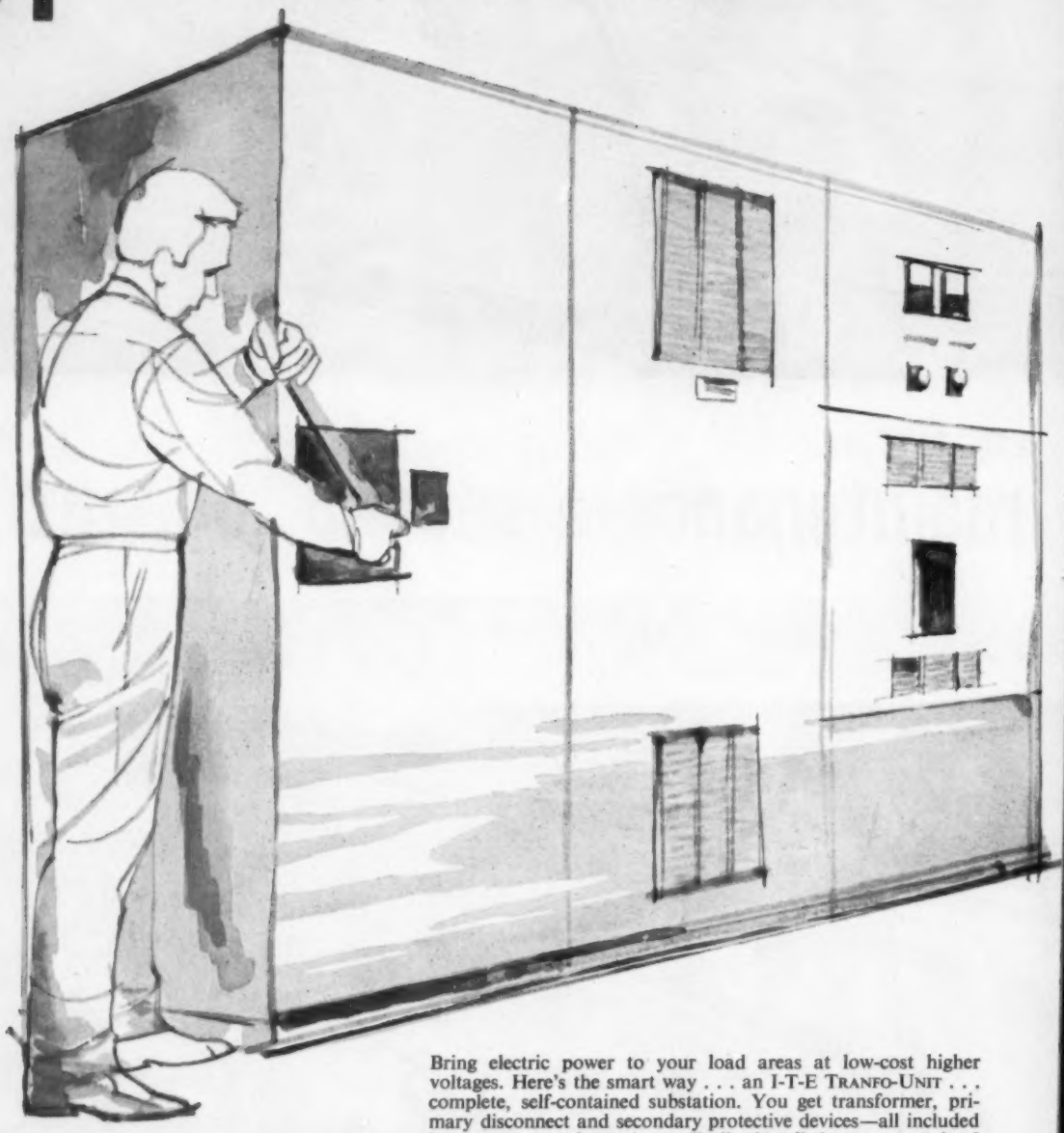
WARM THE MAN AND THE JOB ...*NOT* THE AIR

The rays of heat energy from these generators, like the rays of the sun, heat only the objects they touch and are not wasted on the air around the objects. Once the energy waves strike a person in their path, or the floor, wall or machinery, they are transformed into heat. The result is uniform heating comfort no matter how fast temperatures change.

Approved by American Gas Association, Underwriters, C.G.A and C.S.A.

For more facts circle 556 on Reply Card

I-T-E CIRCUIT BREAKER COMPANY

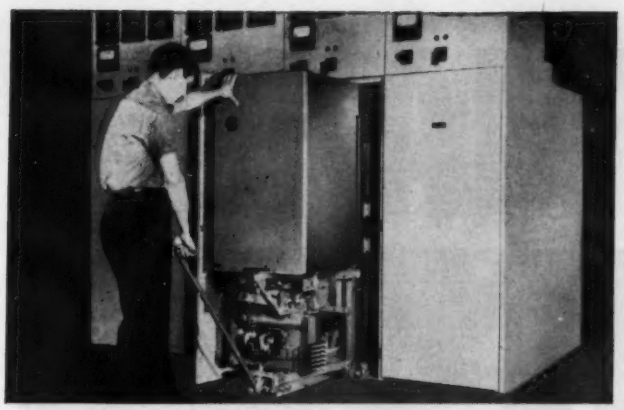


SMART

Bring electric power to your load areas at low-cost higher voltages. Here's the smart way . . . an I-T-E TRANFO-UNIT . . . complete, self-contained substation. You get transformer, primary disconnect and secondary protective devices—all included in one neat, safe package. Easily installed near your load centers. Improves motor performance and lighting efficiency . . . slashes line losses.

An I-T-E TRANFO-UNIT costs no more than hodgepodge arrangements of assorted gear. But it looks so much better. It's safer. And it makes possible significant economies. For example, it's delivered in one piece . . . saving installation expense. Wide choice of components means complete design flexibility. So you can meet your own requirements exactly. Available in the industry's widest range of kva ratings.

Applications for which an I-T-E TRANFO-UNIT is particularly suited include: small industrial loads, warehouses, hospitals, schools, office and commercial buildings. When you install electrical equipment for such uses, benefit from the advantages of the I-T-E TRANFO-UNIT. They are typical of the advantages you get in all I-T-E equipment. Yet when you buy I-T-E, you pay no more. Why buy anything else?



Metal-clad switchgear you can be proud of. Extra sturdiness for longer life. Extra craftsmanship for finer appearance. Extra safety for greater personnel protection. All components completely accessible. Even rear doors are hinged. Advanced design, uniform-flux-density coils mean extra protection against heavy current faults.

600 volt value package. New URELITE® individually enclosed I-T-E K-line circuit breaker—world's most advanced. Main disconnect contacts visible through side window for extra safety. Pull-down handle action provides quick manual make for safety and long contact life. New wide-range overcurrent trip device lets you increase breaker setting when your load increases. No parts to replace.

Saves 50% switchboard space. I-T-E CORDON® circuit breaker provides up to 100,000 amp interrupting capacity with molded case construction. Costs approximately ⅓ less than alternative devices. Available in sizes for many applications, loose or individually enclosed.

I-T-E Circuit Breaker Company
1900 Hamilton St., Phila. 30, Pa.

- ☐ Low voltage switchgear
- ☐ Metal-clad switchgear (5 and 15 kv)
- ☐ Secondary unit substations
- ☐ Outdoor substation structures
- ☐ TRANFO-UNITS
- ☐ URELITE circuit breakers
- ☐ Small air circuit breakers
- ☐ CORDON circuit breakers
- ☐ Power switching centers

Name.....Title.....

Company.....

Street.....

City.....Zone.....State.....

SEND COUPON

Get full details on specific I-T-E equipment. I-T-E engineering assistance is at your disposal.

For more facts circle 557 on Reply Card

NEW RUSTMASTER

RUSTMASTER
EXPOSED PRIMER FILM
DEEP PENETRATION OF VEHICLE PLUS PIGMENT THROUGH RUST
METAL
Deep-down penetration of vehicle plus pigment produced flexible film which was bonded directly to bare metal. Film remained intact despite rupturing of rust layers by bending.

PRIMER "O"
THIN, BRITTLE PRIMER FILM
SHALLOW PENETRATION BY VEHICLE ONLY
RUST
METAL
Thin, brittle primer film cracked and broke away from the surface as panel was bent. Poor penetration performance resulted in improper protection of rusted metal.

PROOF OF DEEP-DOWN PENETRATION...

Primer "O" and RUSTMASTER were applied to rusted metal panels and placed in Weatherometer for 300 hours (equivalent to approximately one year exterior exposure in northern climates). Both panels were subjected to bending (A.S.T.M. Method D-522-41). The brittle, shallow-penetrating film of Primer "O" cracked and failed. RUSTMASTER, which had penetrated through rust and bonded tightly to the metal, retained its flexibility and adhesion!

METAL PRIMER

Actually does what many can only claim

A sound metal primer must provide more than just superficial penetration of rust. *Deep* penetration by *both* vehicle and anti-corrosive pigment is necessary if the primer film is to have the required adhesion, flexibility and durability to combat rust and corrosion effectively.

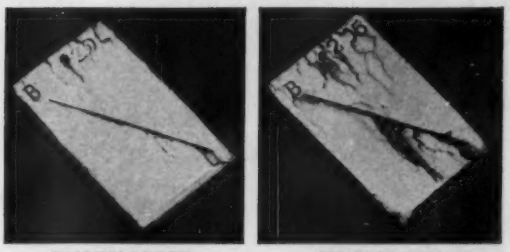
RUSTMASTER contains a special new wetting agent*—discovered by Glidden chemists—that gives it superior penetrating power. So successful have been exhaustive laboratory tests, that RUSTMASTER wetting agent is now being extensively field tested by the Lead Industries Association in formulas for Red Lead and Modified Red Lead Primers, and is included in experimental formulations recommended by the Association to industry for field testing.

RUSTMASTER molecules pierce through rust, carrying *both* vehicle and anti-corrosive pigment to the bare metal surface. Corrosive air and moisture—trapped in microscopic pores—are forced out. The primer adheres firmly to the metal. Result: a stronger, more flexible, more corrosion-resistant finish than ever before possible.

RUSTMASTER dries fast, too. Twenty-four hour recoat schedules permit rapid completion of maintenance painting. And RUSTMASTER may be applied directly over sound rusted metal surfaces after loose rust scale has been removed.

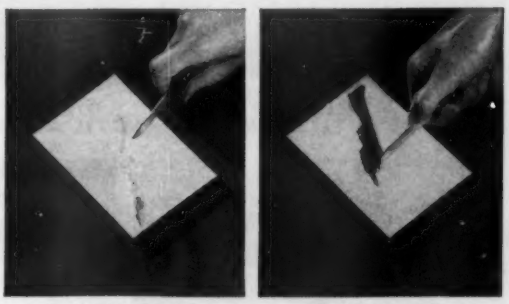
Why not let us tell you more about RUSTMASTER—how this revolutionary new metal primer can help you in your Protective Maintenance Program. Write now for complete information.

*Patent applied for



RUSTMASTER PRIMER "O"

PROOF OF BETTER ENDURANCE—Panels coated with Primer "O" and RUSTMASTER were scratched to bare metal and subjected to salt spray test for 500 hours (A.S.T.M. Method B117-54). Primer "O" allowed corrosion to spread, causing blistering. RUSTMASTER restricted corrosion to the scratched area.



RUSTMASTER PRIMER "O"

PROOF OF BETTER PROTECTION—Primer "O" and RUSTMASTER were applied to rusted metal panels which were exposed in Weatherometer for 1600 hours. Scraping of panels to similar depths showed no sign of Primer "O" pigment below surface—RUSTMASTER anti-corrosive pigment had penetrated deep into the rust.

PROFESSIONAL FINISHES

The Glidden Company
MAINTENANCE FINISHES DIVISION
900 Union Commerce Building
Cleveland 14, Ohio

In Canada: The Glidden Company, Ltd., Toronto, Ontario

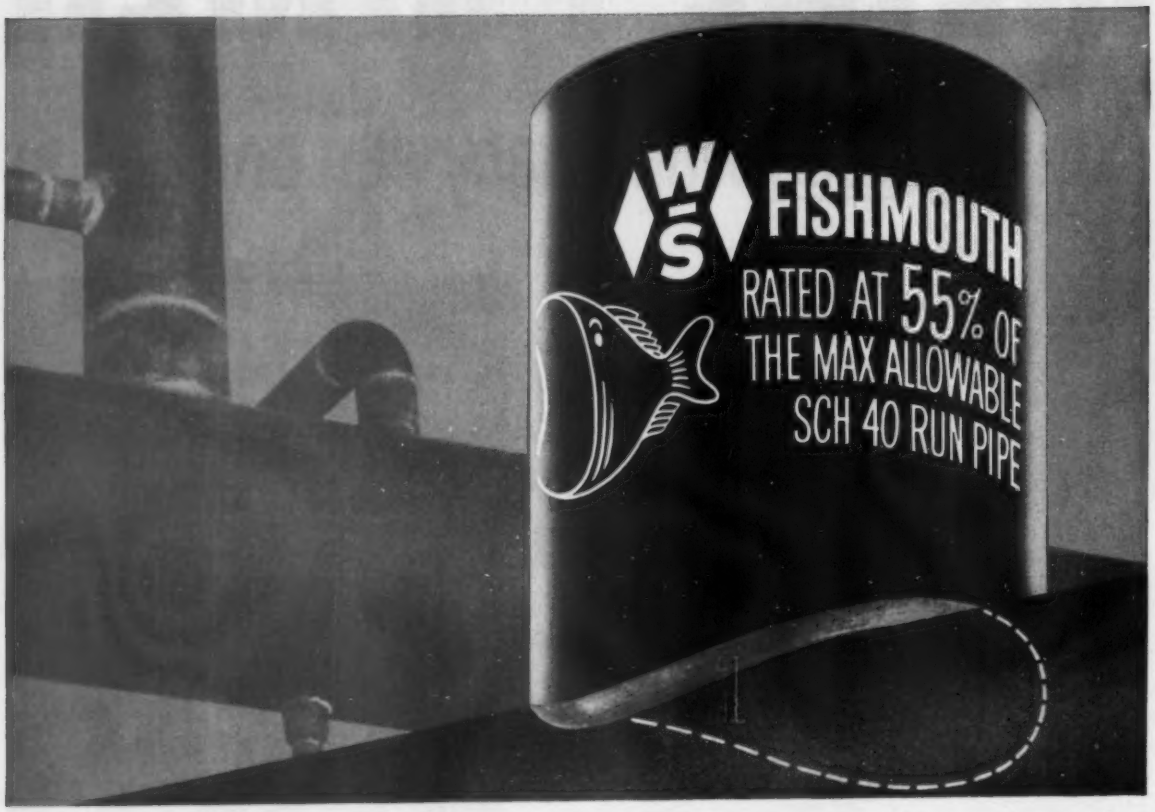
QUALITY Glidden PRODUCTS

For more facts circle 558 on Reply Card

FOR BRANCH CONNECTIONS 2 INCHES OR OVER:

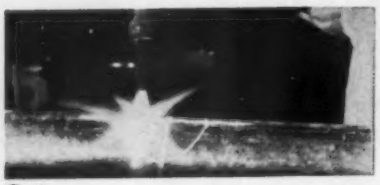
Now! Only 81¢ for a 2″ branch fitting!

THAT'S ALL A NEW, READY-MADE W-S FISHMOUTH COSTS



IT'S THE MOST PRACTICAL WAY TO MAKE A BRANCH CONNECTION

Mark



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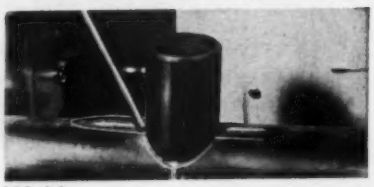


Weld

The W-S FISHMOUTH saves 50 per cent or more over commercially available branch fittings . . . *costs even less than your own field- or shop-made connection.* Made from Schedule 40 pipe, W-S FISHMOUTH is fully machined and perfectly shaped for strong, leak-proof joints. A ready-made W-S FISHMOUTH is rated for working pressures to 55 per cent of maximum run-pipe limits. Sizes: 2″ to 12″ IPS, butt weld ends. Fewer sizes handle many more jobs, eliminate need for special fittings.

No time or cost required to shape, fit or bevel. Ideal for close-quarter work. Easy access to inspect weld penetration or to back-weld. W-S factory machining means a secure, permanent installation every time.

Ready-made, the W-S FISHMOUTH costs less to buy and install than anything you can buy or make. Write, today, for complete information, prices and names of distributors to: *Forge and Fittings Division, H. K. Porter Company, Inc., Box 95, Roselle, N. J.*

FORGE AND FITTINGS DIVISION **PORTER** ***H.K.PORTER COMPANY, INC.***

PORTER SERVES INDUSTRY: with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION; Specialty Alloys—RIVERSIDE-ALLOY METAL DIVISION; Refractories—REFRACTORIES DIVISION; Electric Furnace Steel—CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION, H. K. PORTER COMPANY de MEXICO, S. A.; and in Canada, Refractories, "Disston" Tools, "Federal" Wires and Cables, "Nepcoduct" Systems—H. K. PORTER COMPANY (CANADA) LTD

For more facts circle 559 on Reply Card

COURT DECISIONS —a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

Electrical Contractor's License

APPLICANT for an electrical contractor's license in Chattanooga, Tennessee, that had been dismissed by a lower court, was appealed to the Supreme Court of that state. The applicant contended that he had taken these examinations two or three times, that the examination was in three parts, that in each instance he had passed two of the three parts but that the Board had in each instance illegally and improperly required him to retake all three parts.

"One of the rules," said the court, in sustaining the dismissal of this petition, "which the Board of Examiners had adopted prior to this examination, required that all applicants had to pass all portions of the examination at one sitting and provided that upon failure to do so the applicant upon reexamination should take and pass all three portions of the examination." Court brief 319 S.W. 2d 481, Tennessee, December 12, 1958.

Contract Interpretation

LETTER FROM a manufacturer to a customer read, "Confirming our telephone conversation of yesterday, we can manufacture the 39,000 #RS-5305-W bearings for you at a price of 73.6¢ each, F.O.B. Ann Arbor, Michigan, subject to the following conditions: You will authorize us to purchase for your account all material required to manufacture the rollers, stake-pins and end-plates at a total cost to you of 13.3¢ per bearing."

Purchase order from the customer in response to this letter was in agreement with the terms.

However, a question arose later regarding the interpretation of this contract. The Michigan court said, "The question is: must the customer pay 73.6¢ per unit, in addition to the material charge of 13.3¢ per unit that was previously charged to it, as the manufacturer claims, or must he, instead, pay 73.6¢ minus the material charge as the customer claims."

In sustaining the interpretation of the manufacturer and holding the total cost to the customer to be 86.9¢ per unit, 73.6¢ plus 13.3¢, the court said,

"We think the customer's acceptance dissipated any ambiguity when, after describing the bearings and stating the 73.6¢ price, the purchase order said, 'In addition to the above price we will supply the following materials: You are authorized to purchase for our account material for rollers, stake-pins and end-plates at a total cost to us of 13.3¢ per bearing.'

"We think that the words 'in addition to the above price' (73.6¢) can hardly be reasonably interpreted to mean 73.6¢ per unit minus 13.3¢, as contended by the customer." Court brief 93 N.W. 2d 899, Michigan, January 12, 1959.

Borrowed Employees

WHEN AN INDEPENDENT contractor was directed to go to a garage to make repairs, he discovered he must remove an 80 pound beam accessible only by a ladder. In addition the floor of this garage was slippery with grease and he needed someone to hold the ladder.

He telephoned the company that had sent him for additional supplies and for a man to hold the ladder. The man arrived and was told, "Hold that ladder while I go up there and cut that beam."

As he proceeded with the work he felt the ladder sliding. The helper had gone. The ladder fell and the blow from the beam broke the contractor's leg.

In its defense to the suit, the company contended that the laborer had been borrowed by the contractor and hence, he was the contractor's and not the company's employee.

In holding the company liable and that no borrowed employee doctrine was involved, the Pennsylvania court said:

"We think the ordinary rules of agency apply. The man was sent by the company on this job. There is evidence that his employer told him to hold the ladder and if he held it badly, so did his employer. This evidence excludes the notion that he was this contractor's servant." Court brief 147 Atl. 2d 399, Pennsylvania, January 12, 1959.

Advertising Representations

INJURIES WERE incurred by a workman in the use of dynamite which, it was contended in his suit against the manufacturer, had been warranted by the advertisements and literature of the manufacturer to be safe for the purpose for which it had been sold. In the manufacturer's defense, it was held that the victim had no claim against the manufacturer since the dynamite had been purchased elsewhere.

Of the relation between manufacturer and consumer under circumstances such as these, the Federal appellate court said, "In recent years an increasing number of manufacturers have made their principal appeal directly to the consumer through extensive and effective advertising.

"We know that a given article may pass through several hands after it leaves the plant and that the retailers or middlemen are mere conduits through which the manufacturer distributes his goods. Thus, the consumer has come to rely more and more upon the representations and reputation of the manufacturer and less and less upon those of the retailer.

"This reliance is particularly justified where the articles are either sold in sealed containers or are otherwise of such a nature that no consumer could reasonably rely upon anyone but the manufacturer to detect or prevent latent defects."

Referring to the law established by another and recent decision the court said that it "permits the consumer to look to the manufacturer to make good losses caused by defective products where the sale or use of the product was induced by representations directed by the manufacturer to the consumer." Court brief 261 Fed. 2d 434, Connecticut, November 24, 1958.

Nonconforming Use

FOR MORE THAN 30 years, three and a half acres of land in a New York State village had been used for business. A zoning ordinance of the village reclassified it as a residential district and the owner protested. Although permitted to continue his business on the land as a nonconforming use, he nevertheless sued for a declaratory judgment that the ordinance was void, contending that it was confiscatory and unconstitutional.

In its finding that the zoning ordinance was valid and enforceable, the court said, "Proof that property could be more profitably used for business than for residential purposes is insufficient to warrant the declaration that a zoning ordinance is confiscatory and unconstitutional.

"Municipalities are not required to

COURT DECISIONS

zone property so as to produce the highest return for the owner. The true test is whether the change is part of a well considered and comprehensive plan, since what is best for the body politic in the long run must prevail over the interests of particular individuals and only as the last resort will courts strike down legislative enactments on the ground of unconstitutionality." Court brief 181 N.Y.S. 2d 374, New York, December 30, 1958.

Contract Against Competition

A GEORGIA partnership agreement stipulated, "In the event this partnership is dissolved, the undersigned hereby agrees not to go into, either as principal or agent, any similar business nor to be employed by or permit his name to be used in the operation of said type of business within a 20 mile radius of the said address for a period of three years following this dissolution."

The Georgia court said of stipulations of this character: "Although contracts in general restraint of trade are void—where, as here, the restrictive covenant of the partnership agreement concerns a useful and lawful business, is only in partial restraint of trade and is reasonably limited as to time and place—it is valid and enforceable." Court brief C.C.H.,1959 Trade Cases 69,246.

Airplane Warranty

CONTRACT FOR the sale of an aircraft contained the clause, "It is agreed that the aircraft herein sold is sold as is, where is, unless otherwise specified."

Before the sale contract was made, the purchaser had told the seller of his intended use of the aircraft for aerial photography. No statements, however, were made by the seller indicating any lack of fitness of the aircraft for this purpose.

After 25 hours of flying time an oil leakage was discovered. Examination disclosed that a piece of shim stock had been inserted between the crankshaft and the oil retaining sleeve. This shim stock concealed a worn area in the crank shaft and prevented the serious oil leakage from becoming apparent.

In awarding the purchaser a judgment for damages against the seller, the court said, "The implied warranty that the goods shall be reasonably fit for the purpose of the buyer exists only where the buyer expressly or by implication makes known to the seller the particular purpose for which the goods are required and it appears that the buyer relies on the seller's skill or judgment.

"By advertising and offering a used aircraft for sale without indicating any inability to sustain flight, the seller impliedly represented that it was reasonably fit for the purpose for which it was intended, namely, sustained flight. The seller by the very act of offering his goods for sale, asserts or represents that they are merchantable articles of their kind or are fit for some special purpose and that the buyer relies upon this implied assertion or representation." Court brief 334 Pac. 2d 701, California, February 2, 1959.

Right of Arbitration Lost

BY A COLLECTIVE bargaining agreement, it was provided that no employee should be discharged by the employer either arbitrarily or capriciously; that the employer should notify the union and state its reason before it discharged an employee and also, should promptly notify the union and set forth its reasons for so doing, after the discharge.

Further, that should the union claim the discharge had been made in violation of this agreement, the union must submit its grievance claim within a week after written notice by the employer.

After an employee had been discharged, no statement of a grievance claim was submitted by the union. Despite this omission, the union applied for arbitration, which the employer opposed on the ground that the union had failed to comply with the provisions of the collective bargaining agreement, requiring the submission of grievance claims.

In its refusal to permit the arbitration proceedings under these circumstances, the court said, "It has been repeatedly held that where there are specific time elements for a demand for arbitration, that they bar demands thereafter. The agreement to arbitrate is a contract and the one seeking to have the other perform must show that he himself has complied with its terms. Here, there was not a compliance." Court brief 181 N.Y.S. 2d 110, New York, December 4, 1958.

Refinery a Nuisance

A LICENSE had been issued by the town council of Jamestown, located on an island, for the construction of an oil refinery.

Primarily this island is a residential resort and farming area. No industries are located there other than a few businesses such as retail shops, stores, filling stations and hotels.

Location of this refinery was planned on the northern portion of the island. Residents presented an injunction against its construction.

The injunction was granted by the court. "In determining whether the proposed refinery will be a nuisance to these residents," said the court, "the fact that it may be useful or may contribute to the economic welfare of Jamestown, is not determinative.

"After a careful consideration of all the testimony and the reasonable inferences to be drawn therefrom, and recognizing the right of the refining company to make a reasonable use of its land, I am satisfied that the operation of said refinery in the manner and at the location proposed, will cause a substantial diminution both in the value of the residents' property and in the enjoyment thereof, as measured by the degree of effort which the average man living in such a locality, has the right to expect.

"It follows, that said use will be unreasonable and hence a nuisance to the residents against which they are entitled to injunctive relief." Court brief 170 F.S. 396, Rhode Island, January 5, 1959.

Price Squeeze

ENGAGED IN THE manufacture and sale of methyl methacrulate monomer, used in the production of acrylic sheet, an Illinois corporation was charged with a violation of the Federal antitrust laws.

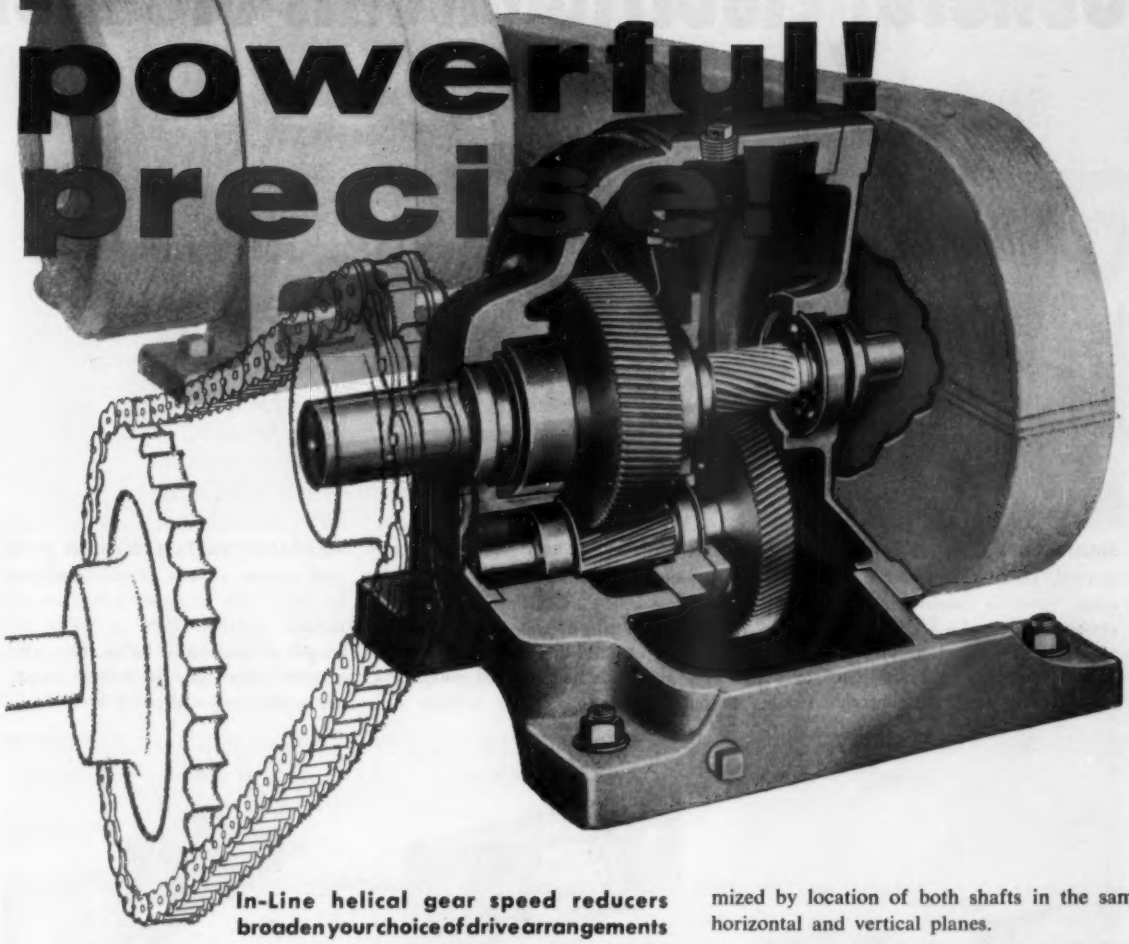
It was charged that this company, since June 1, 1953, had manufactured and sold 99 per cent of all the acrylic cast sheet produced in the United States while little or none was imported from foreign sources.

The competitor contended that it had been forced from the acrylic field because the basic ingredients of this product are kept at an artificially high level and that the price of the acrylic sheet has been kept at an artificially low level.

In refusing to follow the manufacturer's argument that no violation of the antitrust laws was shown, the United States District Court stated that these circumstances were "on all fours" with those involved in another action brought some years ago for the violation of these statutes. In that case the manufacturer had practiced a similar price squeeze by selling aluminum ingots at so high a price that sheet rollers could not pay the expense of rolling the sheet and make a profit. Court brief C.C.H.,1959 Trade Cases 69,318, March 20, 1959.

LINK-BELT IN-LINE HELICAL GEAR SPEED REDUCERS . . .

positive! powerful! precise!



In-Line helical gear speed reducers broaden your choice of drive arrangements

No limit to the number of compact drive set-ups you can arrange with a Link-Belt In-Line helical gear speed reducer. Mount the motor where you will—it needn't be direct-connected. Space demands and layout problems are minimized by location of both shafts in the same horizontal and vertical planes.

Built for hard work, these drives feature the simplest of gear arrangements. Housing is one piece—sturdy and well sealed. Stocked in double, triple and quadruple reductions—up to 206 hp, ratios to 2217:1.

FOR FULL-LINE FACTS

on Link-Belt's comprehensive line of speed reducers—contact your nearest Link-Belt office or authorized stock-carrying distributor . . . or check and send this coupon to Link-Belt Company for data on all or any combination of the following:

- ☐ gearmotors—Catalog 2747
- ☐ motogears—Catalog 2747
- ☒ In-Line helical gear speed reducers—Catalog 2751
- ☐ shaft-mounted speed reducers—Catalog 2618
- ☐ worm gear speed reducers—Catalog 2324-A
- ☐ universal worm gear speed reducers—Catalog 2724
- ☐ parallel shaft speed reducers—Catalog 2619
- ☐ fluid drives—Catalog 2747
- ☐ P.I.V. speed changers—Catalog 2274

LINK-BELT

15,105

PRUDENTIAL PLAZA, CHICAGO 1, ILL.

NAME_____

FIRM_____

ADDRESS_____

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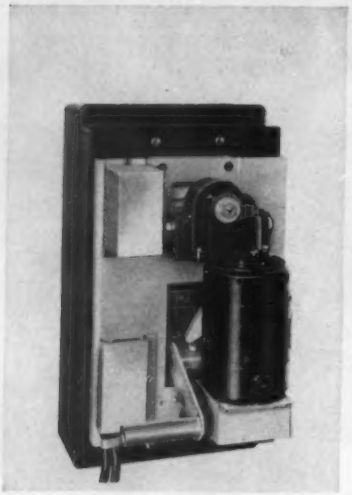
For more facts circle 560 on Reply Card

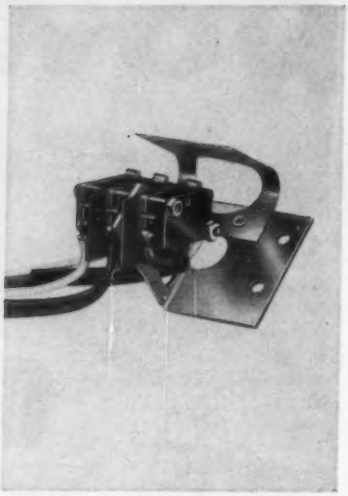
TOUGH APPLICATION OR DESIGN PROBLEMS?

General Electric circuit breaker

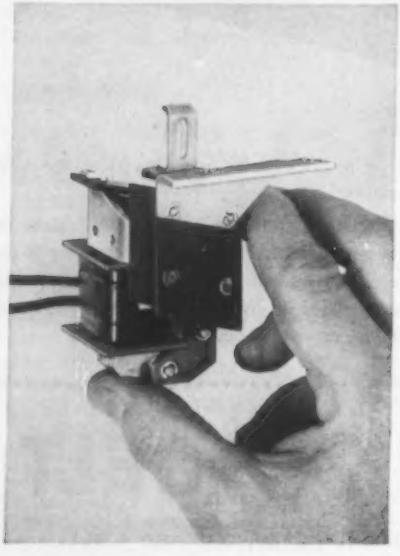
SHUNT TRIP: Opens breaker by remote control, permits pushbutton remote tripping. Used to disconnect power from a remote or centralized point or to interlock with other electrical circuits (AC or DC). Can be actuated by limit switch or relay for automatic feedback control.



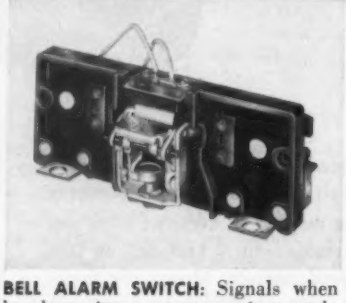
MOTOR-OPERATED MECHANISM: Opens, closes and resets breaker by remote control. Can be used for automatic reclosing or preferred-emergency hook-up by addition of relay. For automated installations, isolated unattended pumping stations, radar systems, etc.



AUXILIARY SWITCH: Operates relay and control circuits at same time as breaker. For remote indication of breaker position (ON or OFF) by means of indicating lights. Can also actuate relays, control related equipment, interlock with other breakers.

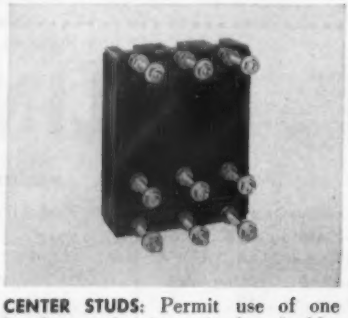


UNDERVOLTAGE RELEASE: Trips instantly when voltage dips. Used to protect motors, elevators, hospital and theatre lights against damage or loss of voltage and to actuate emergency equipment. Voltage must be restored before breaker can be reclosed. No time delay in operation.

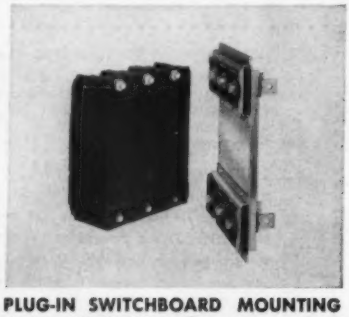


BELL ALARM SWITCH: Signals when breaker trips, protects against unobserved outage, resets automatically.

MECHANICAL INTERLOCK: Prevents two adjacent breakers from being closed in at same time.



CENTER STUDS: Permit use of one breaker and trip unit for double-wound generator or transformer, with full protection.



PLUG-IN SWITCHBOARD MOUNTING BASE ASSEMBLIES: Convert standard G-E breakers to plug-in. May be mounted side by aside.

accessories are the answer!

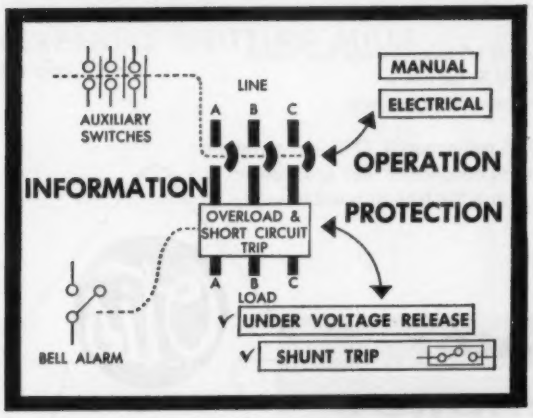
Versatile, convenient, most can be installed in the field

With ever-increasing automation and mechanization, complex control problems need fast solutions — and versatile General Electric circuit breaker accessories cover a wide range of applications to help you solve control problems. They can provide remote closing or opening, lowered voltage protection, overload trip-out indications, automatic reclosing, electrical or mechanical interlocking and primary or sequential operation. (See diagram below.)

For example, if you need to trip a circuit breaker by remote control, the G-E shunt trip is the device you need. It permits push-button remote tripping. In addition to remote control operation, the shunt trip can be used as an electrical interlock with other circuits, either AC or DC. Actuated by a limit switch for automatic feedback control, it is ideal for use in plant safety systems for machine limits, time limits, or any kind of a positive action system.

And you no longer have to wait weeks for delivery of factory-installed accessories. Most General Electric accessories can be field-installed on standard breakers, by your own men, when you need them. Efficient, reliable G-E circuit breakers and accessories answer the growing need for circuit protection, operation and information.

For complete information, see your nearest General Electric distributor, or write Department CBA, General Electric Company, Circuit Protective Devices Department, Plainville, Conn.



PROTECTION, INFORMATION, OPERATION — this example shows how several accessories might work together to give you all 3: Undervoltage device provides low-voltage protection. Auxiliary switch shows you breaker is open. Bell alarm switch tells it has opened on a short or overload. Motor operated mechanism gives you emergency power throw-over or remote operation.

General Electric makes a complete line of molded-case circuit breakers and accessories. 10 to 800 amps — 120 to 600 volts AC, 125 to 250 volts DC.

GENERAL ELECTRIC

For more facts circle 561 on Reply Card

"Here at BERKSHIRE we're hosiery men

LESTER MARBURGER
Superintendent of Plant Maintenance

"We specialize in the manufacture of women's stockings and lingerie," says LESTER MARBURGER. "That's why world-wide Berkshire is the largest selling brand of women's hosiery.

"We've always liked the OTIS specialist's approach to Elevator Maintenance. It means excellent service. In the hosiery industry, the name BERKSHIRE is synonomous with service. And service, even more than charity, begins at home. That's why we've been doing business with the OTIS Elevator Company since 1906, when we erected our first building.

"The OTIS specialist's approach has served us consistently and well. Our only 'down' time, if you'll pardon a pun, is the time necessary to reach the 1st floor from the 5th.

"At present, we have 12 OTIS Freight and Passenger Elevators under OTIS MAINTENANCE. We have complete confidence in their continued performance."

What is the OTIS *specialist's approach* to elevator maintenance?
It is MEN . . . MATERIALS . . . METHODS.

MEN: Elevator maintenance is no one-man job. It is an organization task requiring experts in many lines. No individual, even if he devoted his entire time to the job, could do it properly. It calls for men with an unusual combination of skills plus long OTIS training in studying parts, assemblies, functions, replacement procedures, testing and adjusting. Some degree of elevator complexity can be gleaned from the illustration at right.

MATERIALS: Original OTIS parts and specially designed OTIS maintenance equipment are within one hour of 90% of all OTIS elevators in the U.S. for use in scheduled replacements—and to hold emergency shutdowns to a minimum.

METHODS: With more than 40,000 elevators under OTIS maintenance, OTIS has developed an actuarial procedure that replaces wearing parts well in advance of their breakdown point to hold shutdowns to an absolute minimum and assure the highest possible safety.

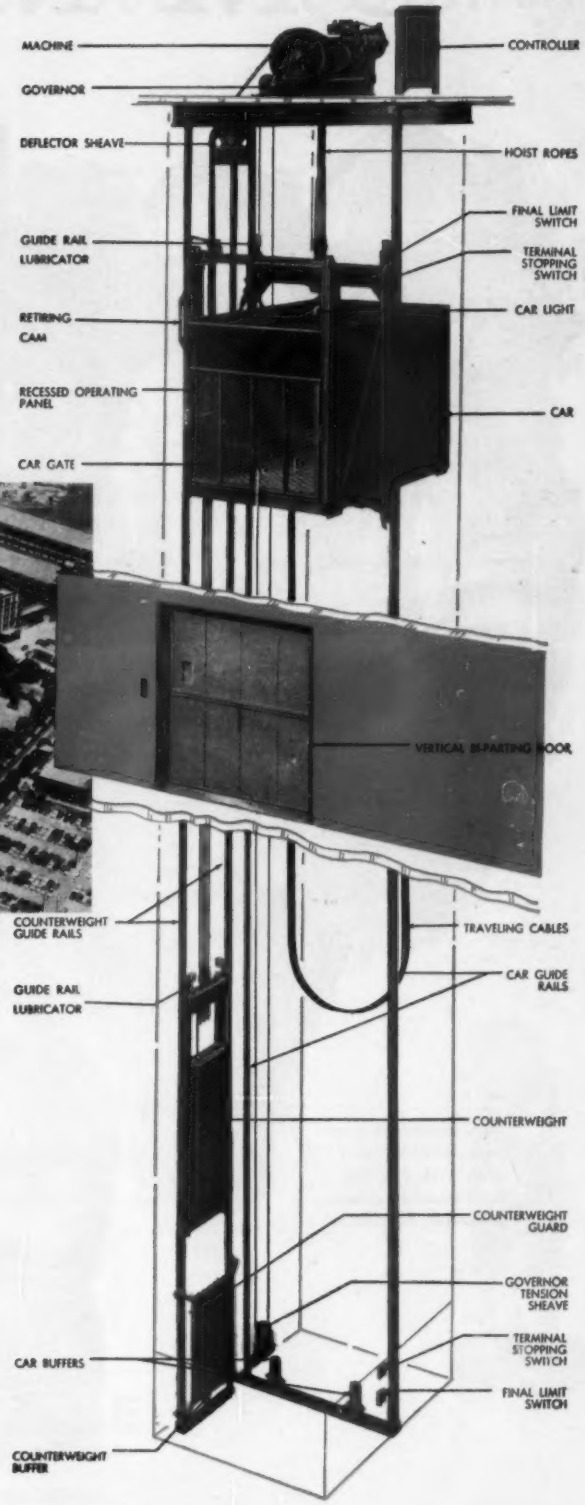
elevator maintenance

THAT KEEPS ELEVATORS RUNNING LIKE NEW

OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N.Y.
OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA

. . . not elevator maintenance men"

BERKSHIRE KNITTING MILLS
Reading, Penna.



For more facts circle 562 on Reply Card

J-M Marinite...

Here's how

Now construct your own ovens *in your shop* with efficient, easy-to-work Johns-Manville Marinite.

fast, new way to oven economy

. . . easy to fabricate . . . easy to maintain . . . builds and insulates in one operation

If downtime and costs are delaying needed oven changeovers—or installation of new ovens—in your plant, here's big news: Johns-Manville Marinite, made of asbestos and diatomaceous silica, can show you the way to build your own high-efficiency oven *in your own shop* at low cost.

Get these important savings

When you build your oven with Marinite, you eliminate the need for linings and outer facings, because Marinite is *both* an efficient insulation *and* a structural board. Your shop can prefabricate oven panels from large 4′ x 10′ sheets with standard saws and drills—assemble them quickly with a minimum of structural support.

Cut maintenance to the minimum

Marinite ovens last indefinitely with little or no maintenance. Made of asbestos fiber, diatomaceous silica and an inorganic binder, Marinite never rusts, rots or corrodes . . . is completely unaffected by moisture condensation during cyclic shutdowns. A rigid, homogeneous material, Marinite eliminates "hot spots" caused by soft insulations that settle and sag in service.

Change over with Marinite now for new oven efficiency

Don't put off your oven changeover another day. With Marinite's low conductivity, you can add new efficiency to your oven at unmatched low cost. And you'll find Marinite cuts heat loss so effectively that areas directly adjacent to ovens become usable, comfortable work areas.

Marinite now carries Underwriters' label

Marinite-23, 36, and 65 now carry Underwriters' Laboratories label for: *zero* flame spread; *negligible* fuel contributed; *zero* smoke developed (based on 100 for untreated red oak). For information write Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

Large Rigid Sheets, up to 4′ x 10′ make Marinite the ideal material for the largest oven jobs.

Workability of Marinite can help you cut oven costs downtime by fabricating and assembling your own ovens.

W. C. Dillon & Co. uses Marinite for easy assembly and close temperature control

W. C. Dillon & Co., Inc., Van Nuys, California, makers of scientific instruments and temperature control cabinets for materials testing, uses Marinite to maintain precise temperature *and* to present a clean, trim appearance. "We would certainly recommend Marinite to any concern interested in *cutting costs and in producing a fine piece of finished equipment,*" says Robert E. Dillon, V. P.

Made of Marinite, Dillon cabinets maintain precise temperatures for materials testing.

JOHNS-MANVILLE JM PRODUCTS

JOHNS-MANVILLE
Insulations
FOR LASTING THERMAL EFFICIENCY

For more facts circle 563 on Reply Card

Lubrication

NEW GREASE WITH EP PROPERTIES TAKES 700°F TEMPERATURES

In three years of field testing, a unique new grease called Thermatex EP 1 has:

—lubricated plain bearings operating at 700°F.

—regularly withstood steam pressures of 125 psi at 300-325°F for 20 hour periods.

—effectively lubricated equipment handling corrosive chemicals.

—resisted coking and solidifying in steam joints where temperatures reach 400°F.

Advantage lies in unique combination of properties

Users agree that the major benefit of Thermatex lies in its unique combination of extreme pressure properties with high heat resistance. While several greases now on the market have one property or the other, Thermatex is believed to be the first which effectively combines both.

Maintenance savings stressed

The use of Thermatex has already helped slash maintenance costs in a surprisingly wide number of applications. To indicate its potentialities —here's what happened when it was used in the steam joints of a paper drier machine: The previous grease used by a West Coast paper manufacturer would invariably solidify and coke in the last few feet of its supply line under the 400° heat. These failures occurred as often as every two weeks.

Three years ago, Texaco persuaded the manufacturer to give the experimental grease a trial. Since then, according to the user, no lubrication failures whatever have occurred, and no evidence of coking or plugging has been recorded.

Capabilities and limits

Information now available shows that Thermatex EP 1 will lubricate satisfactorily at 450-500°F when relubrication occurs every 3 or 4 days. It will provide adequate protection at 550°F with more frequent lubrication periods. Over this figure, the grease's useful lubricant life is measured in hours, but a centralized pressure system can still insure completely adequate lubrication.

For complete information and test results, check the coupon.

Oil mist lubrication gaining wide acceptance

Lubrication by means of an oil mist or fog is rapidly proving its advantages in many types of industrial machines. According to plant engineers, use of oil mist can provide a relatively inexpensive, truly centralized lubrication system.

How it works

In this type of system the oil is atomized into extremely fine particles—less than 2 microns in diameter. The resulting fog can be carried long distances through straight pipes and around bends without any appreciable condensation. The oil condenses only on fast moving parts —where it is needed. On slower moving parts reclassification fittings are used to produce either spray or droplets.

Advantages are significant

Proponents of oil mist lubrication cite a number of advantages the system has over conventional lubricating methods. They include the following:

Use of oil mist eliminates the danger of drippage which might contaminate the material being processed. Points which are hard-to-get-at or in dangerous locations can be lubricated from one convenient spot.

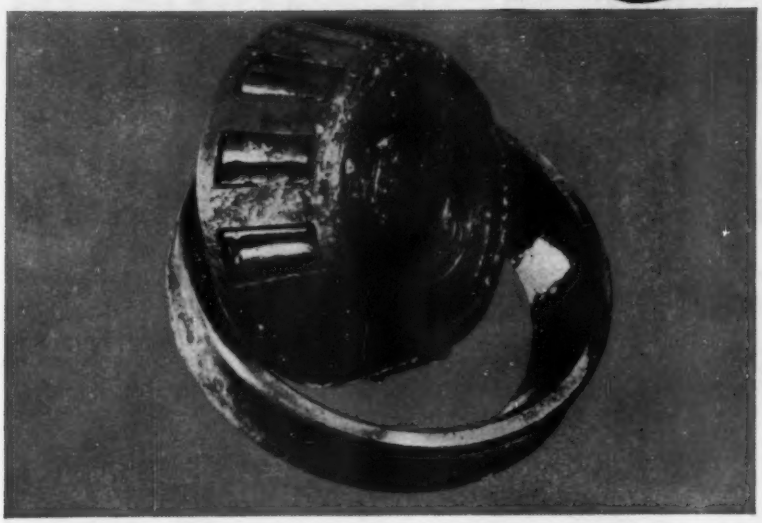
Positive air pressure in the system tends to check the entrance of contaminants such as water, dirt and abrasives—while the air itself provides some cooling effect.

Choice of oil is important

Experts offer a word of caution when it comes to selection of the oil. To be avoided are oils containing graphite, latex, insoluble soaps, fillers or other solids. Best choice seems to be an oil with viscosity at 100°F. (SU) of not over 1,000 seconds.

Texaco products tested and recommended for oil mist applications include Regal Oil PC R&O, Regal Oil C R&O and Meropa Lubricant 1. Test results for these and other recommended Texaco oils are available. Check coupon at right.

news



The difference between Fe_2O_3 and $Fe_2O_3H_2O$ exonerated the lubricant in this bearing failure.

Deposit analysis can uncover surprising reasons for failure

When equipment fails, industry's natural tendency is to blame the lubricant. For this reason, samples of oils and greases—often no more than mere specks—sections of failed gears, bearings, and other ruined pieces of equipment are analyzed at the Texaco Research Center, Beacon, N. Y. Here they are subjected to a searching analysis by technical service experts using a tremendous variety of apparatus and procedures.

Lubricant is seldom guilty

Of the numerous samples submitted every year, the lubricant is guilty in less than 1% of the cases. Take a typical example:

A customer submitted the roller bearing illustrated above. The bearing and its lubricant were liberally contaminated with both red and black material. X-ray diffraction analysis disclosed that the contaminant was an alpha ferric oxide which is characteristic of fretting corrosion—usually correctable only by a design change. Had ordinary rusting occurred the contaminant would have been hydrated ferric oxide—and a finger could have been pointed at the lubricant for allowing water to come in contact with the bearing.

The March, 1958, issue of Lubrication Magazine contains a fascinating series of these "detective" stories. Write for your copy; the supply is limited.

Explains Significance of Lube Tests

The October issue of Lubrication Magazine is designed to give the lubricant user new insight into the significance of lubricant tests. The article demonstrates how the tests —which determine some lubricant properties—can help the lubrication engineer in selection of lubricants for specific equipment. Check the coupon for your free copy.

NEW PRODUCT NEWS

Chemical grinding coolant leaves no oily film—keeps machines cleaner. Helps prevent heat check, permits the use of a finer grit wheel—*Cooltex.*

Selection of cutting or grinding fluids can be critical production problem

Which is best—a straight cutting oil, a soluble oil emulsion, or a chemical coolant? Picking the right type is often a difficult problem, yet the correct choice can often yield major production savings, according to Texaco's chief Metalworking Engineer.

Multitude of factors complicate job

It is pointed out that there is no "best" type of fluid—it all depends on the type of operation. Some cutting jobs, for example, can get by with just a coolant, others—such as automatic screw machines—need a fluid that can lubricate as well as cool, because of inevitable leakage between sumps. Physical properties of the work, high heat—even hard water—can also affect the choice.

Grinding: New chemical coolant adds to choice

Chemical coolants—like Texaco's Cooltex, for example, are comparative newcomers to the grinding operation. However, many operators can point to production boosts of over 200% by using Cooltex instead of an oil. But again it all depends on the particular problems of the operation.

Expert advice can save money

Also underlined is the fact that calling in an expert to discuss cutting oil requirements can pay off for a great many manufacturers. Texaco, for example, maintains a staff of Metalworking Lubricant Engineers from coast to coast, whose prime function is consultation on cutting oil problems.

TEXACO INC., 135 East 42nd Street, New York 17, N. Y., Dept. E-LN-30

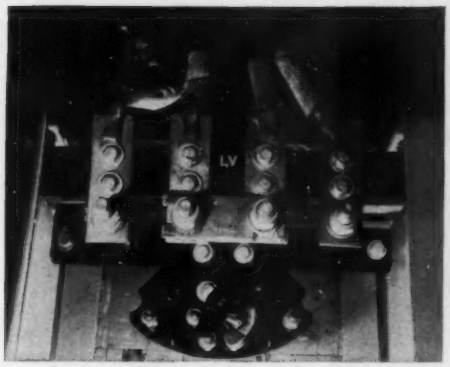
Dear Sirs:
Please send me more information on

- ☐ Thermatex
- ☐ Cooltex
- ☐ Recommendations for oil mist lubricants
- ☐ Please send the October issue of Lubrication Magazine

Name_____
Firm_____
Address_____
City_____
Zone_____ State_____

For more facts circle 564 on Reply Card

WESTINGHOUSE TRANSFORMERS "QUIETLY" PERMIT 25% SAVING IN ELECTRICAL DISTRIBUTION COSTS



No load tap changer permits secondary voltage correction in seconds—a twist of the wrist adjusts secondary voltage for changing load conditions—another Westinghouse exclusive.

One 45-kva and two 75-kva transformers are located in the basement. The low weight, low height of these transformers permitted them to be mounted on top of the distribution switchboard and metering cubicles, a further saving in space in that location.

New 17-Story Pittsburgh Office Building Uses 12 Lightweight, Maintenance-free Westinghouse DT-3's to Reduce Costs, Lower Sound Levels

Two exclusive Westinghouse developments, inorganic Siliclad insulation and grain-oriented Hipersil® steel cores, have cut transformer size 25 to 51%, weight 17 to 32% over former Class B 80°C rise units. Further, maximum thermal compartment temperature is 5°C rise, and maximum case temperature is 35°C rise. This compactness and efficiency is offered in combination with the lowest sound levels available in the industry. The DT-3 reduces noise levels below 45 decibels—15 decibels or more below NEMA standards; the core-coil assembly floats on a mechanical vibration damping system, independent of case, base and connecting conduit. Here, in the words of those who should know, is the story behind the choice of Westinghouse transformers for this installation.

Mr. W. F. Schmidt, Ebner Associates, Consulting Engineers

"A 480/277-volt system, which is much more economical to install than a standard 208/120-volt system using conventional conduit and cable, was our choice for this installation. However, taking 480/277 volts throughout the building does not solve the problem of supplying power at the proper rating for office equipment, lighting and other services. Installation of transformers in the basement with separate risers for the 480/277- and 208/120-volt systems would have defeated our savings aim. So we designed the system for transformer mounting on every other floor. To avoid loss of usable floor space, electrical closets which housed the transformers were placed adjacent to work areas in the building. To avoid any possibility of irritation and complaints from transmitted noise, we specified that the equipment operate at a maximum of 46 decibels. The Westinghouse units have certainly equaled that requirement, as well as being able to withstand a 10-kv impulse test and a 150°C rise at full load rate."

Mr. Donald Jones, Secretary, Hale Electric Co., Inc. (left)

"Several hours of installation time were saved on each unit, because the DT-3's were supplied with attached integral circuit breakers on the primary voltage side. These smaller, lighter transformers permitted the engineers to design an overhead mounting—saving valuable floor space—permitting much easier access to the electrical closets for maintenance and service."

For complete information on the DT-3 transformer, call your local Westinghouse salesman or distributor, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsbugh 30, Pennsylvania. J-70918

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS

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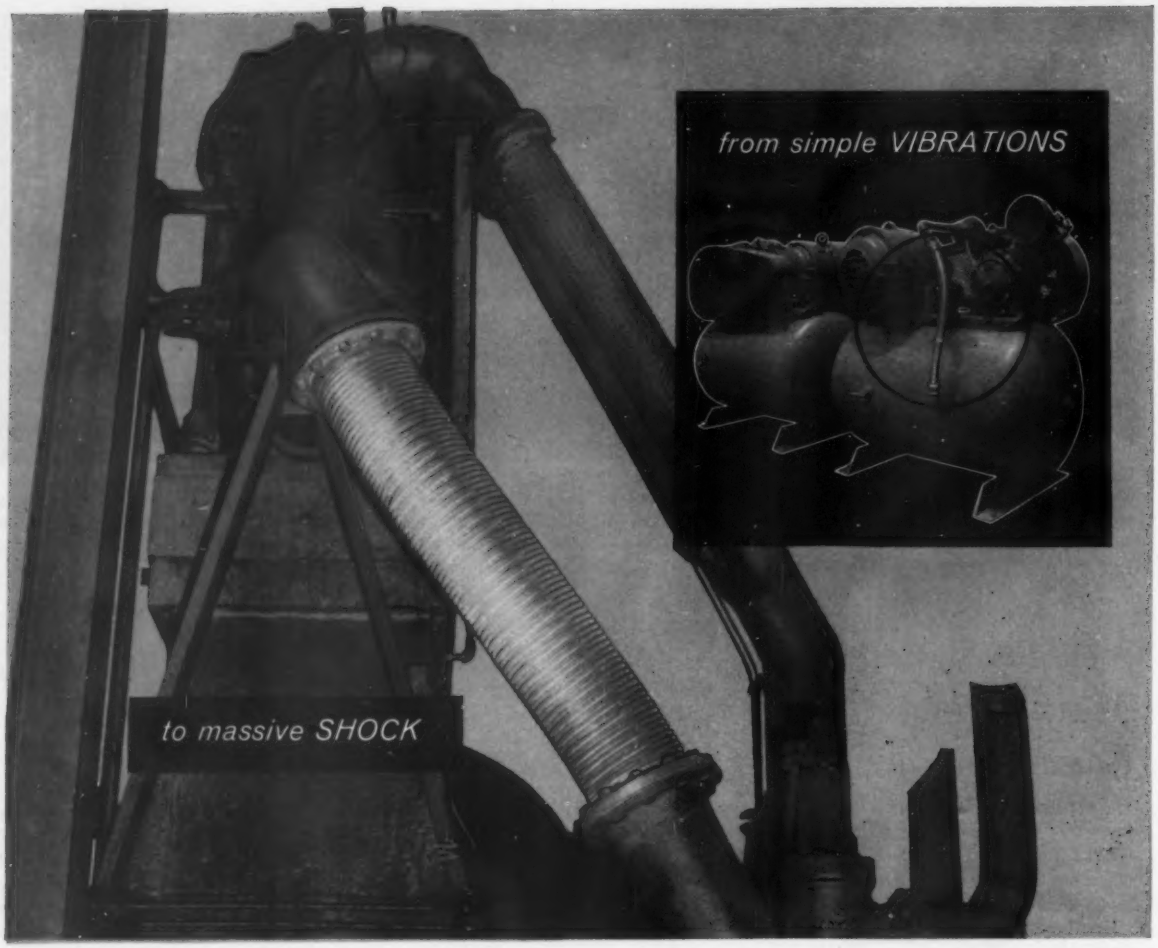


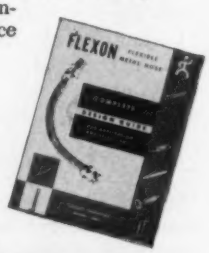
METAL HOSE to absorb any motion... meet all pressure, temperature, and fluid needs

Flexonics capabilities and experience in meeting the full range of piping problems—from the simplest to the most drastic—is without equal. Whether your requirements involve one or any combination of motion, pressure, corrosion, temperature, or fluid factors, Flexonics will quickly meet the challenge.

Note in the photo above how flexible hose absorbs shock loads while it solves a misalignment problem in the lines of a press at Kropp Forge Company.

The complete Flexonics standard line of metal hose will provide you the construction, material, and size (3/16" to 24" I.D.) that the job demands. Your special engineering requirements are more readily met by Flexonics vast facilities—enjoying a record of outstanding service to every segment of industry.

METAL HOSE DESIGN GUIDE
Write for your free copy . . . a must for your reference file.



IM-388

TOMORROW'S ENGINEERING TODAY

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Flexonics Research Laboratories, Elgin, Illinois
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WHAT'S JUST AHEAD IN THIS ISSUE?

- HEAVY DUTY CYCLES, shock loading and high ambient temperatures are among the enemies of electric motors. At Mueller Brass Co., Port Huron, Mich., where all these (and other) problem conditions prevail, silicone insulation was the answer to motor burnouts. Savings on motor repairs amount to $5000 a year in spite of the higher unit costs of silicone rewinds. For details, turn the page.

- USE OF acid and dichromate in the processing of brass and copper tubing naturally carries with it the problem of treating the effluent before it enters a public stream. On pages 100 and 101 is an account of how Scovill's new plant in New Milford, Connecticut, treats these waste liquids.

- TO HELP the plant engineer "define" his functions and responsibilities, in a manner that will more fully assess the plant engineering function for management, the American Institute of Plant Engineers has prepared a "Code of the Plant Engineer". On page 102, we present a condensation of this valuable reference.

- FLUID POWER has tremendous potential for application in an industrial plant. Plant engineering personnel should be familiar with what fluid power can do, how it does it . . . and what it can't do. On page 106, you will find the first in a series of articles on how to design fluid power systems.

- STEAM TRAVELS long distances at Caterpillar's new plant near Aurora, Illinois, in fulfilling the heating and cooling needs of facilities covering more than 29 acres. It's generated in a modern utility building isolated from the main plant; the article beginning on page 120 points out some of the features of the equipment in this building.

- LOW-VOLTAGE, remote control system cuts heating costs. Switches in the boiler room allow the operator to select day or night thermostat settings or open and close steam valves in distant buildings. For additional details turn to page 128.

- HAVE YOU ever taken into consideration all the costs involved when you analyze a lubricant for value? If you look at the chart on page 136, you will see that weight-times-price-per-pound is only one of many points to be considered. A standardized lubrication program can help avoid these "extras". To help you set up a new program or revamp an old one, take a look at "Standardization in a Lubrication Program."

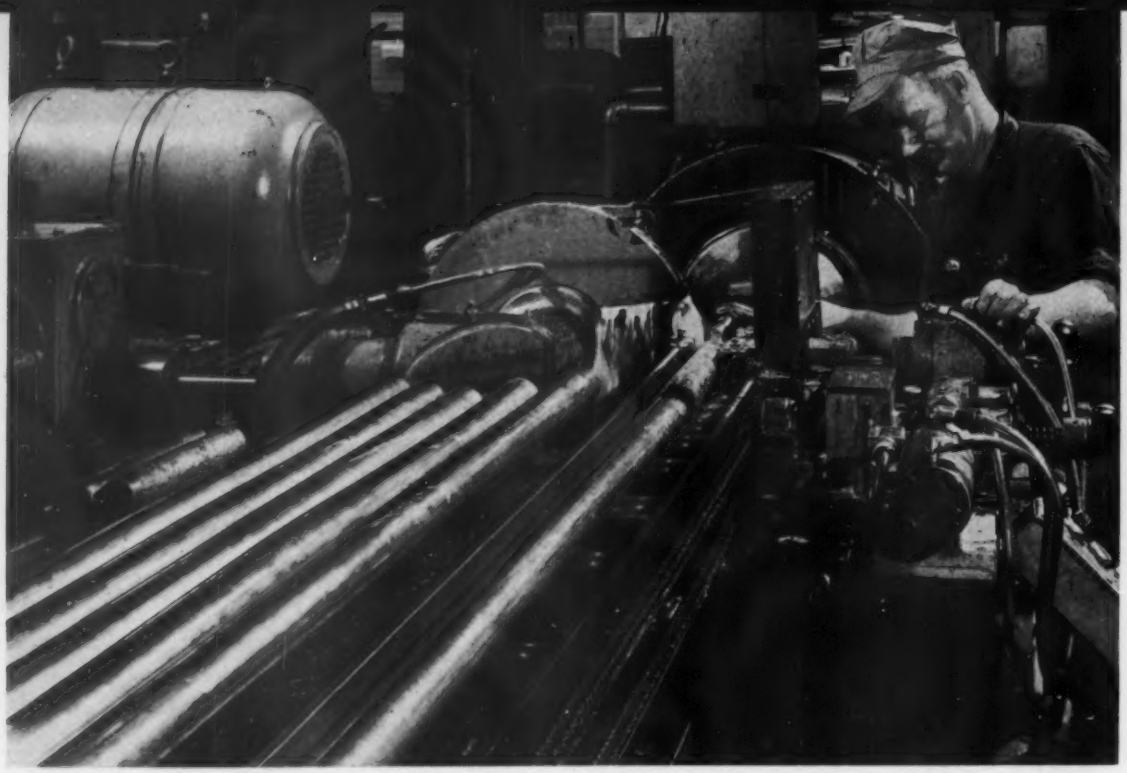


Fig. 1. Silicone insulation is used on 15-hp motor on rod slug cutoff machine, subject to high duty cycle, shock loading.

HIGH TEMPERATURE INSULATION EXTENDS MOTOR LIFE

Rewinding program saves company $5000 annually

By KENNETH N. WILKENS, Asst. Maintenance Supt., Mueller Brass Co., Port Huron, Mich.

IN SEARCHING for a means to lengthen motor life in our plant and reduce motor maintenance costs, we investigated the use of silicone impregnating varnish (Class H) for insulation and had some of our motors rewound with it. The experiment showed promise and in 1954 we entered a program of gradually having most of our electric motors rewound with Class H.

Our program to date has saved us about $5000 annually, not including labor costs. We expect this figure will increase as the program progresses.

Our company makes brass, bronze and aluminum forgings, brass rod, etc. Manufacture of these items requires operations that produce conditions unfavorable to long electric motor life. However, we have used Class H widely with excellent results on crane motors to increase the service factor; on vacuum pumps to combat steamy conditions; on Kingsbury machines that are subject to overload, shock loading and high duty cycles; on draw-bench drive motors that are subject to an oily and wet atmosphere as well as high duty cycles, shock loading and overloading; and in several other applications.

Use of Class H insulation, made by Dow Corning Corp., has meant greater efficiency machinewise since it enables us to increase the duty cycle on our motors; and the overload duty cycles that can occur in operation can be accommodated safely without damage to the winding. However, we do not upgrade rated horsepower on any motor. The bulk of our motors are in the 1-, 3-and 5-hp class. Our cranes use 3-, 5-, 7½-, 20-, and 25-hp motors and we use a few large motors—400 hp—to run the pump on the extruder; on draw-benches; on piercers; and on air compressors. On these larger motors generally we have not changed to Class H insulation.

On small motors—about one quarter horsepower—we usually find it cheaper to replace than to rewind them. New motors of larger sizes are specified standard because they carry a lower price tag than

specially wound motors. We run them with the original winding until that burns out and we then have them rewound with silicone. Meantime, we're learning something about their operating characteristics. Labor charges are not part of our savings, and normally burden charges are not made nor is a price tag affixed to downtime.

Rewinding a motor with Class H insulation costs, of course, considerably more than a Class A or Class B rewind. Generally Class H costs 100 per cent more than Class A; Class B costs approximately 50 per cent more than Class A. In our experience Class B winding has an average life of 10 years but we have not been using Class H long enough to be able to make an accurate estimate. However, even on those motors which were rewound at the commencement of the program, we have not yet come across any sign of drying out of the insulation.

Motor Replacement Analysis

We do not carry a spare for any particular motor in the plant, but when a motor burns out it will be replaced by one from that or another department. Then, before it is rewound, we make an individual analysis taking into consideration the location to which it will be returned, the type of duty—heavy or otherwise—moisture conditions and ambient temperature to which it will be subjected.

Many of our motors must perform in extremely high ambient temperatures—in fact, at an educated guess, we attribute 75 per cent of motor burn-outs to this condition. All departments where cranes are located, for instance, have a heating source such as an annealing furnace, billet-heating furnace, or melting furnace.

Originally we had Class A motors on our cranes rewound with Class B insulation after they burned out, but we experienced considerable difficulty even with this type of insulation especially during summer.

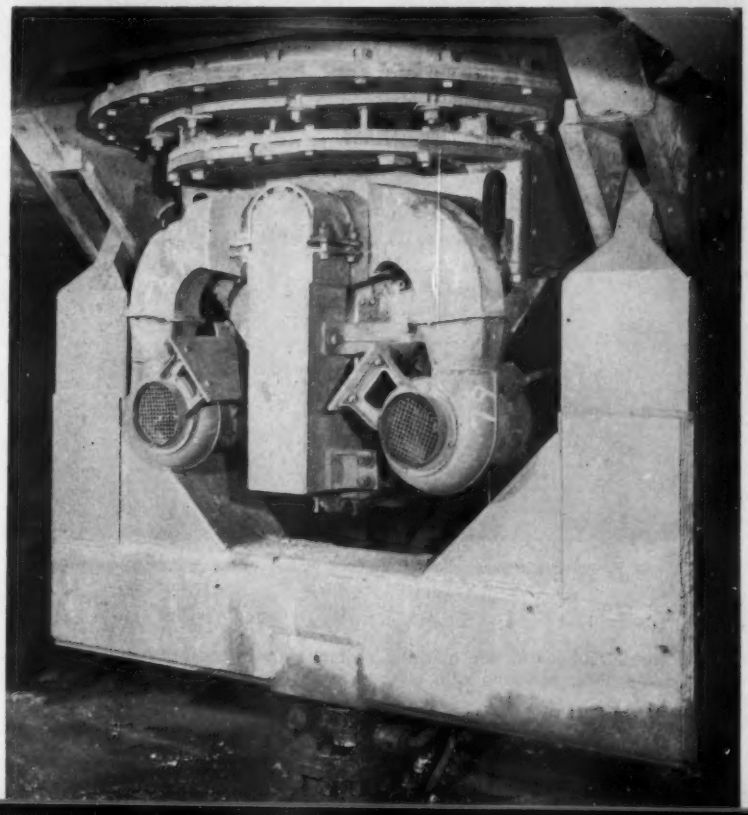
In our rod mill, we have two overhead traveling cranes with 25 hp, 1200 rpm splashproof motors. One crane takes large heavy loads but makes few trips; the other makes short travels with much starting and stopping, almost always

Comparison of Motor Costs

Here is a comparison of the new costs and rewind costs of three motor classes. They were given by The Mueller Brass Co. as typical of costs paid by the company. It will be noted that on new motors Class B is approximately 25 per cent more than Class A and Class H is approximately 50 per cent more than Class A. On motor rewinds Class B is approximately 50 per cent more than Class A and Class H is approximately 100 per cent more than Class A. The new motor costs are for totally enclosed, fan cooled, ball bearing motors.

	Class A	Class B	Class H
1 hp 1800 rpm			
New	$ 79.50	$101.46	$119.00
Rewind	39.00	48.50	77.25
1 hp 1200 rpm			
New	91.16	113.12	136.50
Rewind	50.00	67.50	85.00
3 hp 3600 rpm			
New	127.68	149.64	191.52
Rewind	61.00	90.00	119.00
3 hp 1800 rpm			
New	138.88	166.33	208.32
Rewind	56.00	81.00	112.00
5 hp 3600 rpm			
New	148.96	176.41	264.61
Rewind	67.00	93.00	119.00
5 hp 1800 rpm			
New	157.92	185.37	236.88
Rewind	64.00	97.00	136.00
10 hp 1800 rpm			
New	313.00	391.00	469.00
Rewind	97.00	146.00	180.00

Fig. 2. Totally enclosed 5-hp motors on induction furnace fans, which operate in high ambient temperatures, benefit from use of silicone insulation on winding.



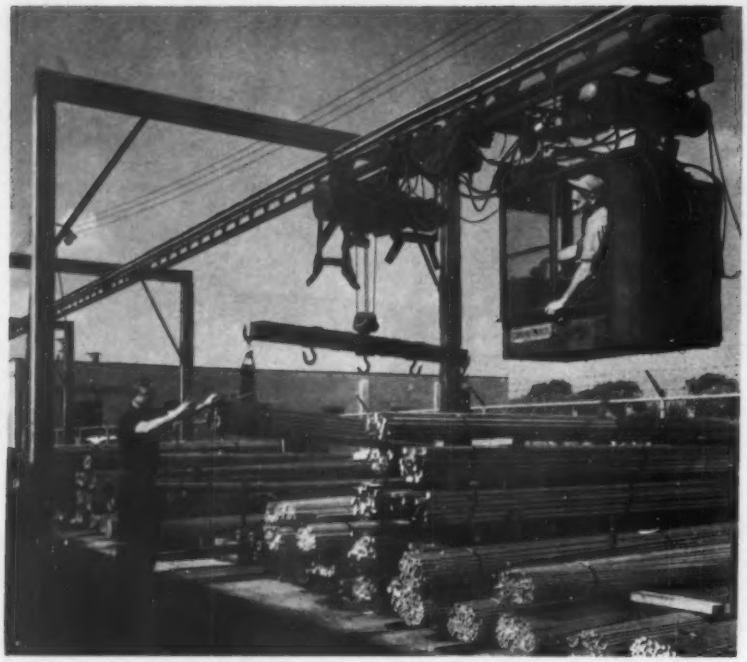


Fig. 3. Monorail crane motor had 30-minute rating, is now operated 16 hours daily. Silicone insulation increased both service factor and moisture resistance.

operating in the first or second step of the resistors. These starting overloads together with the high temperatures sometimes heated the motor to such an extent that the solder on the metal band holding the winding on the rotor, would melt. Motors that have been rewound with Class H insulation have not been affected by these conditions.

Again, high temperatures, a high duty cycle, moisture (quenching and pickling baths are nearby) many short travels, made it economical to use Class H insulation on the motor of a gantry crane used for handling loads of brass rod.

Another installation where the ambient temperatures caused trouble was on two, 5 hp, 3600 rpm totally enclosed fan motors on an induction furnace. These motors were rewound and showed good results.

Ten-horsepower motors used to drive exhaust fans on the stacks of melting furnaces also suffered from the heat. They are located about 20 ft above the furnaces used to melt oil-soaked chips. Occasionally, as

Fig. 4. Class H insulation was used on vacuum pump motor in steamy atmosphere.

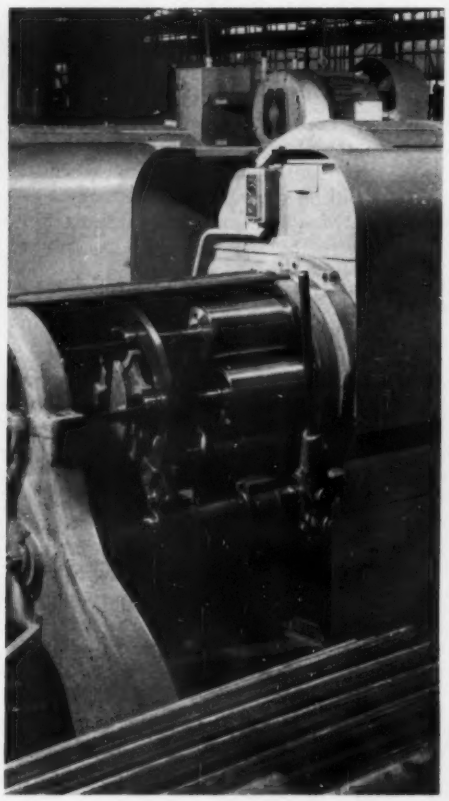


Fig. 5, right. Automatic bar machine motor, subject to continuous duty and shock loading, was rewound with silicone insulation. Rated hp is not upgraded.

the furnaces are loaded, flame shoots up the stack close to the motors. We were losing one motor out of 10 every week but after having them rewound with Class H we have but an occasional failure, possibly one in 6 months.

High ambient temperatures are one of our major reasons for using Class H insulation, but we have found it useful for other reasons. The motor on a monorail crane used for outdoor handling of bundles and brass rod was rewound to give increased service factor and moisture resistance. The motor originally had a 30 minute rating but now is operated constantly 16 hours each day, without ill effects.

The moisture resistance of Class H insulation is proving its worth in other applications. The motor on a vacuum pump which is subject to a steamy atmosphere and condensation has stood up well. Condensation droplets tend to run off the silicone quite readily, which contributes to keeping the motor in good condition. This particular motor is also subject to high ambient temperatures.

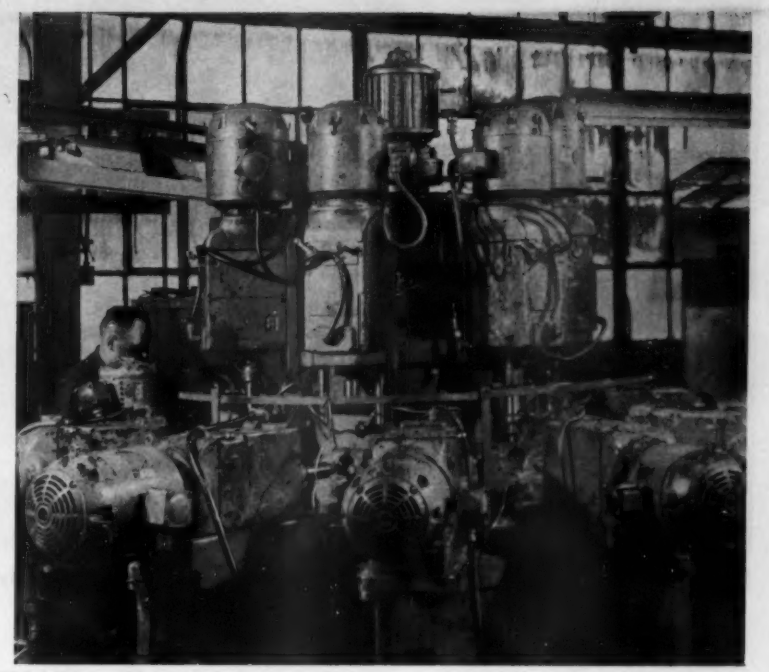


Fig. 6. Burnouts on multiple spindle machine motors with standard insulation were frequent. Failure rate dropped considerably with use of silicone insulation.

Silicone showed its value on one occasion, when some pumps in the plant were flooded out. The motors, Class H wound, just kept on going.

Shockloading on draw benches, multiple spindle machines, rod cut-off machines, hot metal forging presses, automatic bar machines, etc. is common in our plant. On all of this equipment Class H insulation has been used with complete success when the original insulation needed replacement. Motors on the equipment ranged from 3 and 5 hp on the Kingsbury multiple spindle machines to 30 hp, 1800 rpm totally enclosed on the automatic bar machines to 60 hp, 1200 rpm totally enclosed on the hot forging presses.

An example of the motor failure rate that we were experiencing shows up on the Kingsbury machines. In 1953 we had 10 motor burn-outs in eight months with Class B insulation. With Class H we had 10 failures in 12 months in 1956. (This does not take into account variations in production schedules.) Because of the considerable difficulty we had had with motors on the Kingsbury's, we feel that the situation has been greatly improved.

In only one case did we find Class H unsatisfactory. This was on an abrasive sander used for grinding and polishing brass fittings. We found it very difficult to control the horsepower. The first application of a silicone winding failed and since we thought that there was a possibility of its having been misapplied, we tried a second time, but it was still unsatisfactory, and we returned to a Class B winding. This failure we attributed to mechanical abrasion from the fine brass dust.

Since we entered this program we have had approximately 400 motors rewound with Class H. During 1958, for example, 90 motors were sent out for repair. Of these, only three were rewound Class A. The remaining 87 were rewound Class H. Our total cost for motor repairs for the same year was approximately $20,000.

The program is long range and will of course be applied only to those motors for which we consider it a real advantage. We figure this would include about 50 per cent of all motors in the plant. We believe that our rewinding program has helped us to keep our company competitive because it has given us greater dependability to meet production schedules. **End**

Fig. 1. Basin receives effluent from mill; lime addition is controlled automatically in the building pictured at the right.

PLANT WASTE MADE FIT FOR RIVER

Air agitation stabilizes pH; Automatic treatment controls value

LIQUID INDUSTRIAL wastes from production operations at the new brass and copper tube producing facilities of Scovill Manufacturing Company in New Milford, Connecticut are of two general groupings: weak wastes and strong solutions.

Weak wastes are discharged continuously from rinses during pickling and dichromate brightening operations. Strong solutions of spent pickling acid and dichromate brighteners are discharged at intermittent intervals.

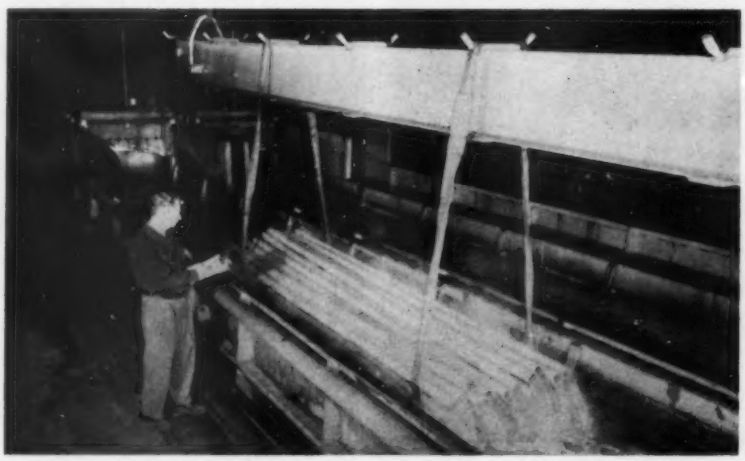
Both of these wastes contain higher concentrations of copper, zinc, chromium, and sulfuric acid than is permitted by the State Water Resources Commission of Connecticut in waste discharged into the Housatonic River.

The first step undertaken towards establishing a type of wastes treatment by which concentration of metal ions might be reduced to acceptable levels, consisted of a study of the quantity and characteristics of wastes from similar operations at the firm's Waterbury plant.

Included in the study was a series of laboratory tests on the weak wastes for the purpose of determining: 1. The most favorable pH range for treatment of the wastes. 2. The settling characteristics of the sludges produced. 3. Compaction characteristics of these sludges.

Finally, tests were made on the strong wastes to determine the most feasible means of their disposal. The results of these studies and tests formed the basis of design for a modern treatment plant.

Fig. 2. Turbulent pickling operation contributes to waste mill effluent treated.



Weak rinse waters discharged continuously from pickling and dichromating operations flow to an open earth basin in which they are agitated by means of compressed air to minimize fluctuations in pH and temperature. The wastes are pumped from the basin to a mixing tank in the treatment building where sufficient lime is added to raise the pH of the wastes to 9.5.

Treated wastes then flow to a combination flocculation and clarification unit where the copper, zinc, and chromium hydroxides produced by addition of the lime are coagulated and permitted to settle.

The unit called the Clariflocculator has two concentric compartments. The clarification chamber which is 40 ft in diameter by 7½ ft deep encloses the flocculation compartment which is 16 ft in diameter by 5½ ft deep.

An average flow of 400 gpm of mill metal-finishing wastes is fed to the unit after flocculating and conditioning chemicals have been added. In operation, this feed enters the flocculating chamber through an overhead pipe.

During a thirty to forty-minute detention period in the flocculating chamber the vertical paddles produce efficient coagulation between the incoming liquid and the newly formed flocs or groups of solid particles. Finely divided particles are built into well-formed flocs which will settle out rapidly.

Incoming feed displaces the flocculated mixture downward through the open bottom of the flocculation compartment into the clarification basin. Detention here averages three to four hours.

Large flocs of solid particles settle out of the quiescent liquid to the bottom of the tank forming a sludge. This sludge is continuously raked by the clarifier rake blades to a hopper in the center of the tank bottom from which it is withdrawn. Clarified liquor continuously overflows a v-notched peripheral weir at the surface of the tank. It is then returned to the river.

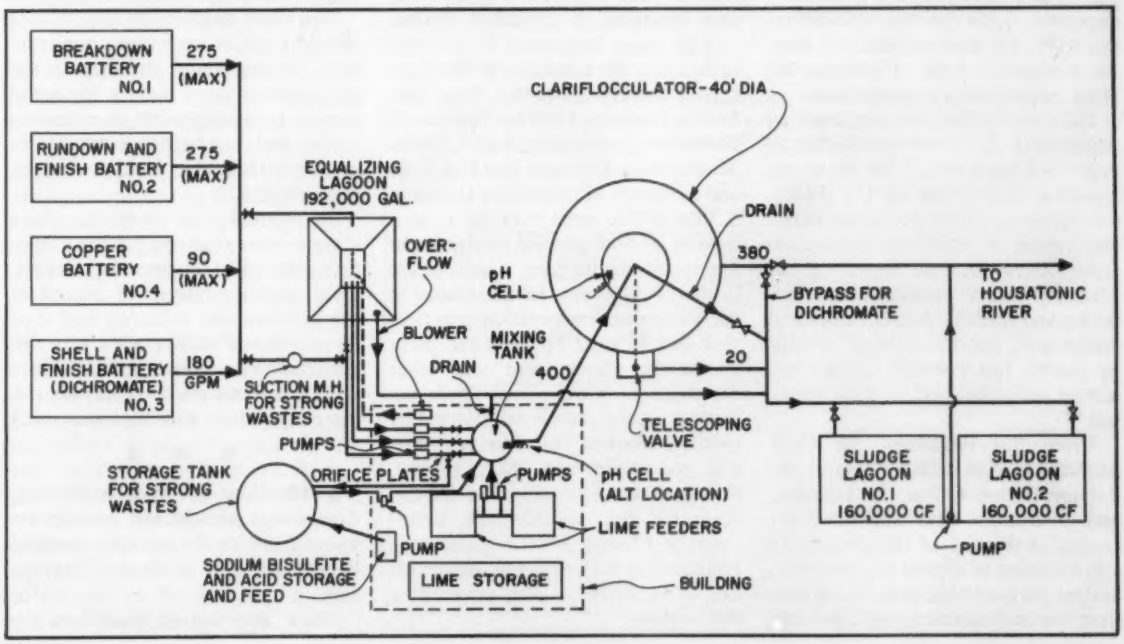
Strong spent pickling acid is given separate pretreatment. Because a common collection system is used to convey all industrial wastes to the treatment plant, this highly concentrated acid can be dumped only during those periods when there is no flow of weak rinse waters or other wastes to the wastes collection system. During such times the concentrated wastes are diverted to a sump at the treatment plant and from there are pumped into a storage tank.

When weak wastes are again discharged to the treatment plant, the spent acid is pumped from the storage tank at a low and controlled rate. It flows to the mixing tank for treatment along with the other weak wastes.

Fig. 3. Through this center, addition of lime is automatically controlled.

Spent concentrated dichromate brighteners are also isolated and treated in the same manner as the concentrated pickling acids. However, sodium bisulfite is first added to the dichromate brighteners to reduce the hexavalent chromium to trivalent chromium. Sulfuric acid is also added. **End**

Fig. 4. This schematic diagram shows the general tie-in of the waste handling and treatment units utilized at the mill.



AIPE STATES PRINCIPLES

CODE OF PRACTICE FOR THE PLANT ENGINEER

1. Organization of plant engineering department
2. Relationship to general management
3. Cooperation with production department
4. How to work with accounting department
5. Coordinating operations with purchasing department
6. Working with contractors and consultants
7. Legal department and plant engineering operations

The following article is a brief summary of the material that appears in the recently-issued 24-page "Code of the Plant Engineer" compiled and published by the American Institute of Plant Engineers, P.O. Box 185, Barrington, Ill. Copies are available from the Administrative Secretary. Price: $1.00 each.

WITH THE FULL realization that the *emphasis* on certain phases of plant engineering will vary depending upon the type of industry, the AIPE has now satisfied the need for a standard code of practice for plant engineering organizations.

Function of the plant engineering department is stated succinctly on page 9 of the Code: "The plant engineer is responsible for the design, construction, alteration, maintenance and repair of buildings, structures, grounds, roads, and repair of all plant equipment including manufacturing and research and development equipment; the operation of all utility plants; fire prevention and protection activities; and security activities."

From this beginning the Code proceeds to give detailed data on the Administrative Office, its function, and operations and activities. Included in this list of responsibilities are: forecasts of capital expenditures, budget preparation, records of construction and maintenance contracts, establishment of work schedules, investigation of recurring maintenance failures and excessive repair costs, and initiation of corrective action.

This same procedure is followed in detailing the functions of the Plant Layout and Design Office, Plant Protection Division, Utilities Operations Division, Equipment and Utilities Maintenance Division, and Buildings and Grounds Maintenance Division.

One of the most valuable contributions to both general management and plant engineering management is the spelling-out, in the Code, of the reciprocal cooperation practices that should exist between the plant engineering department and other departments in the plant. These departments, the ones most affected by or most affecting the plant engineering operations are: Management, Production, Accounting, Purchasing, Research and Development, Insurance, and Legal. Plant engineering's relationship to consulting engineers and contractors is also covered in this section.

Excerpts from this portion of the Code are given below in order to illustrate the scope and tenor of the material covered.

• • •

Management: The plant engineering department should report periodically to management upon work accomplished, work in progress, status of conditions under its control, and work anticipated. Where desirable these reports should include comments and recommendations.

The plant engineering department should base its operation, construction, maintenance and repair expenditures upon a budget. It should present to management an estimated budget and then base its expenditures on the budget that is approved by management.

In reporting on problems where there is more than one practical solution, the plant engineering department should present all phases of the problem and solutions and state its preference with reasons why this particular choice was made. (There is a total of six major points regarding cooperation with management.)

• • •

Production: The plant engineering department should not assume responsibility for determining quantity, quality, time or method of production.

Plant engineering should be re-

AIPE President Bill Wallin, Chief, Plant Engineering, Lexington Road Plant, Western Electric Co., Winston-Salem, N.C., and Code Committee Chairman Jim Snow, Plant Engineer, Lever Brothers Company, Hammond, Ind., examine copy of AIPE Code.

sponsible to management for the safety of structures and for the condition of machinery so that it may be operated safely. (There are ten major points of cooperation with the production department.)

● ● ●

Accounting: The accounting department should, when possible, supply accounts based upon such classifications as the plant engineering department may require.

Plant engineering should be consulted as to life of any building or equipment insofar as it concerns any phase of depreciation problems.

Plant engineering should approve all charges for work done by its departments before they are charged to production or other departments.

Records of changes in inventory values and depreciation of plant and equipment should be supplied to the accounting department by plant engineering. (There are twelve major points of cooperation between accounting and plant engineering.)

● ● ●

Purchasing: Plant engineering should initiate requisition for all supplies and equipment for which it is responsible. It should also write all specifications for and approve all materials furnished upon its requisitions.

Major or specialized equipment should be selected by plant engineering, but cooperation with purchasing should exist in the handling of records and contracts.

Plant engineering should prepare contracts and specifications and review with the purchasing department all bids on equipment, construction, power purchases, or other allied service in compliance with company's internal audit regulations. (There are eight major points of cooperation between purchasing and plant engineering.)

● ● ●

Contractors: Plant engineering should prepare for management and legal departments all major contracts for engineering work, purchase of equipment, and the erection and maintenance of structures.

Plant engineering should check and approve all plans, specifications and contracts before their award.

Plant engineering should be responsible for carrying out all construction contracts according to plans and specifications. (There are ten major points in the Code regarding contractual work.)

● ● ●

Insurance Department: Plant engineering should pass upon recommendations made by insurance companies and be responsible for their enforcement.

Plant engineering should prepare, for the executive in charge of insurance, estimates of losses used in settling insurance claims based upon figures submitted by the departments where losses occurred.

Plant engineering should be provided with all schedules used in calculating insurance rates and make recommendations that will reduce premium payments. (There are eleven major points of cooperation with insurance department.)

● ● ●

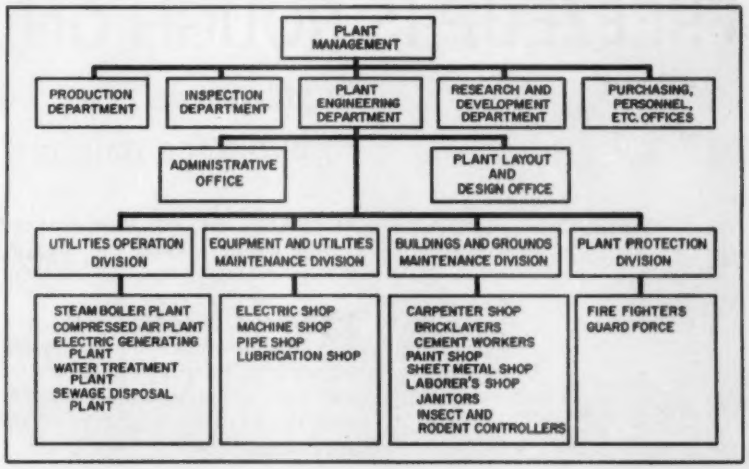
Legal Department: Because it is the agent of the company in many dealings, the plant engineering department should have general knowledge of the relations between an agent and principal.

Plant engineering should have a general knowledge of federal, state and municipal laws and ordinances in connection with its work. Copies of state laws on such questions as boiler inspection, elevator operation, sanitary facilities, storage of inflammable materials, should be kept in plant engineering files.

Plant engineering is directly responsible for compliance with many laws controlling manufacturing such as: maintaining proper entrances and exits, adequate sanitary facilities and good sanitary conditions. (There are ten major points of cooperation between legal and plant engineering.)

It is the opinion of PLANT ENGINEERING's editors that this work is an important contribution to plant engineers everywhere. It can serve not only as a guidepost to plant management but also as a constant reminder to the plant engineer of his considerable scope of responsibility. That is, if any plant engineer needs to be reminded! **End**

Organization of plant engineering department in a company having but one plant. Staff functions are performed by the plant engineer's office; line authority is carried by departments, divisions. Code also describes multi-plant setup.



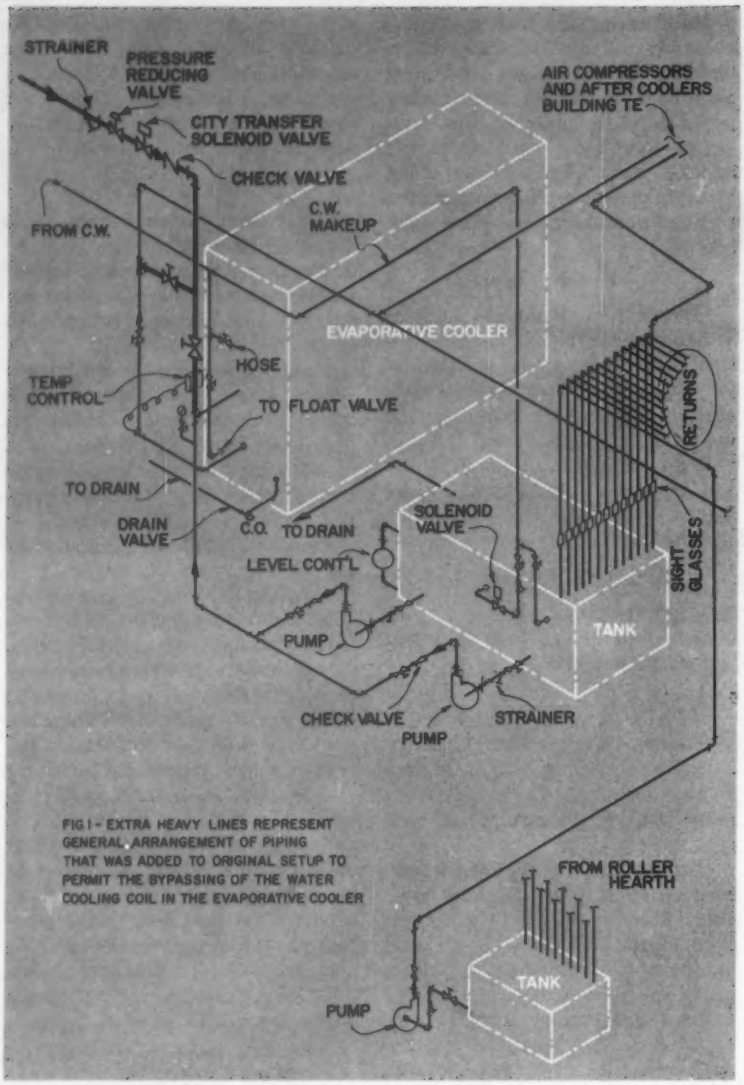


FIG 1 - EXTRA HEAVY LINES REPRESENT GENERAL ARRANGEMENT OF PIPING THAT WAS ADDED TO ORIGINAL SETUP TO PERMIT THE BYPASSING OF THE WATER COOLING COIL IN THE EVAPORATIVE COOLER

FREEZEUP IS ROUGH ON WATER COIL

System was plant engineered to avoid ice damage

By WALTER JACOBY, Maintenance Supt., Special Products Div., I-T-E Circuit Breaker Co., Philadelphia, Pa.

DAMAGE PREVENTION is a vital function of a maintenance department. To spot potential losses and take action to avoid an accident, is foremost in the mind of good supervision.

Because ice formation could create havoc in the cooling coil of the indoor installation of the evaporative cooler shown partially in Fig. 2, simple anti-freeze controls were applied to this equipment. Even

though the cooling coil could be bypassed by valving, dead water remaining in the coil would freeze if equipment were shut off, due to outside air entering the cooler through the suction and discharge ducts. Providing drainage through a drain valve does not eliminate the element of human error.

If a failure or fault occurs on unattended equipment where and how should immediate corrective action take place?

The first step is to notify someone in the plant who is qualified. Figure 3 shows a bulb-type, two-step thermostatic switch which responds to water temperature in the coil to sound an alarm in the boiler room.

If water temperature falls below 40 F or rises above 140 F, a visual and audible alarm is given to the operating engineer; one is on duty on each of the shifts.

If the engineer cannot find the source of trouble, he merely shuts down the cooler. This action automatically transfers the supply of water from the recirculating pumps to city supply. When on city supply the water still passes through the cooling coil in such quantity that it does not freeze.

On the other hand, if the bypass were put into effect with the coil being out of service for some reason, what would prevent a freezing downdraft from outside to enter equipment through duct work and freeze any water which may be in the cooling coil?

The solution, of course, is to block the entrance of undesirable air. This air would enter if someone accidentally tripped a breaker, or a motor starter tripped, and if power failed in the middle of the night when perhaps maintenance talent is not available.

As previously mentioned, power failure would automatically transfer water supply from the cooler to city service. However, if demand were low or the coil were bypassed, ice would form, expanding and bursting the tube bundle.

In placing the cooler on the line, the first component energized is the spring-loaded damper motor. This motor operates a damper in the suction and discharge ducts through some linkage. See Fig. 2. When the full open positions are reached, cams operate the limit switches. The limit switches are normally open and connected in series so that full open positions on both dampers result in the energizing of the fan motor, and circulating and spray pumps follow in automatic sequence.

Power failure not only shuts down the cooler but the spring on the anti-freeze damper motor returns the dampers to closed positions when power is off. In this manner, outside air is isolated.

Many times loss prevention is treated lightly because it does not represent a direct productive activity. But, think of this! In this particular case the coil involved cost $3800.00. The simple alarm and damper controls cost approximately $600.00. Under the circumstances it is a good investment. **End**

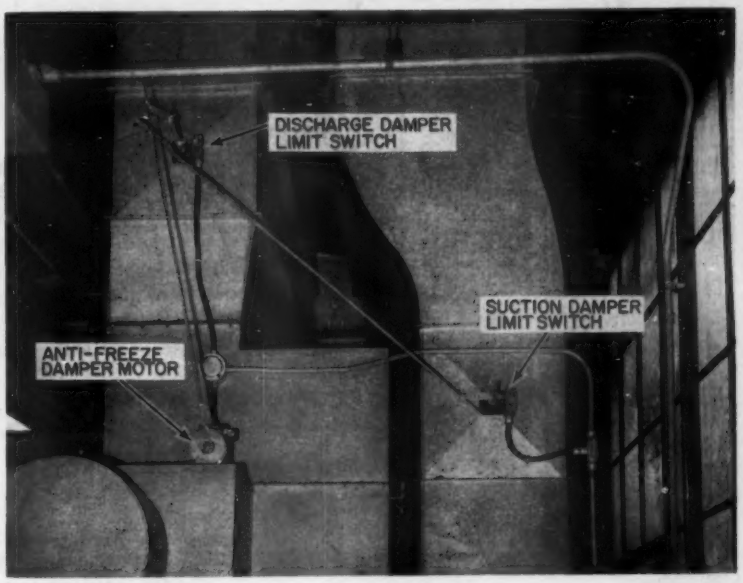
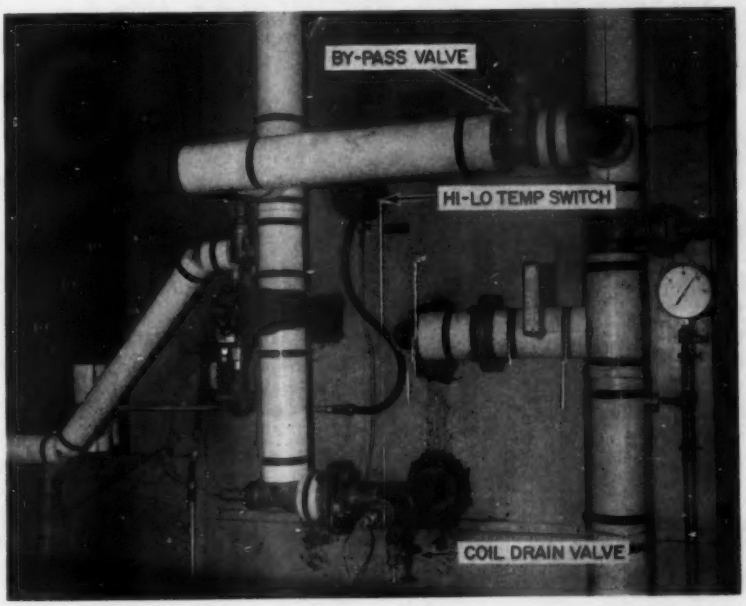


Fig. 2. The motor driving the air fan is energized after damper motor affects the closing of the limit switches.

Fig. 3. Low and high temperatures are sensed by a bulb; corresponding switch contacts complete alarm circuits.



HOW TO DESIGN PNEUMATIC-HYDRAULIC ACTUATION SYSTEMS

FIRST IN A SERIES OF ARTICLES

This series of articles will show plant engineering personnel the many ways in which fluid power equipment will help them in problems of machine motivation. In the past we have published articles on other important phases of fluid power—the maintenance and installation of pneumatic and hydraulic systems.

In these articles we will concentrate on system design. Understanding system design helps plant engineering to improve existing systems, create better designs for new systems and make better use of fluid power equipment to relieve bottlenecks in their plant.

TODAY WE FIND much being accomplished by plant engineering groups in converting existing mechanically operated devices to hydraulic or pneumatic operation.

In the first section of this series we will cover pneumatic actuation, and in the second section hydraulic actuation. All of the systems shown will use the JIC (Joint Industrial Conference) symbols as revised and adopted at the April 15-17, 1959 meeting.[1]

This first article will cover the rapid approach and rapid retraction of a tool to workpiece. This may be accomplished by a pneumatic cylinder or a pneumatic motor.

Let us assume that we want to move a tool X from a point F, the starting point of the tool, to a point G, the location of the workpiece. You will find many such applications in almost any plant. Such examples are a simple clamping device, a drop hammer, a pneumatic punch, an assembly machine, or coining machine.

One should use good judgment, taking into consideration all the requirements, when choosing components for a pneumatic system. Be sure to select components that have the stability to meet the needs of your application. As an example, if you have a clamping job which requires only a small force and is operated intermittently you don't need the same type of equipment as for an application that must actuate 150 to 200 cycles per minute.

There are many instances when "throw-away-type" equipment is satisfactory for a job. With these, it is cheaper to buy new components than to try to repair worn out ones. By the same reasoning don't try to use the throw-away-type components in a difficult exacting application.

In selecting the cylinder the user has several choices. The choice he makes will be reflected in the over-all cost both of components and installation. Let us look first at a circuit on a simple clamping device, Fig. 1, which shows the use of a single-acting cylinder. These cylinders use air power in only one direction and spring or gravity in the other direction of piston movement. In this circuit the head of the clamp is the tool and when it moves forward it clamps the workpiece.

Facts About Single-Acting Cylinder

There are advantages and disadvantages to the use of the single-acting cylinder with spring return. Some of the advantages are: a. requires less piping since only one cylinder port is required; b. use of three-way operating valve instead of four-way valve reduces cost; c. uses less air since air is being used only for the outstroke of piston.

Disadvantages are: a. loss of power on outstroke of piston due to need for overcoming spring tension; b. cannot control the exhaust side of the piston; c. generally requires a cylinder having over-all length greater than a double-acting cylinder; d. only a small amount of power available on return stroke, i.e., only the force of the spring; e. cushioning on spring side not too effective.

[1]Copies of the complete JIC standards of Hydraulics and Pneumatics may be obtained from the American Standards Association, 70 West 45th St., New York, N. Y. Ask for Y32-10.

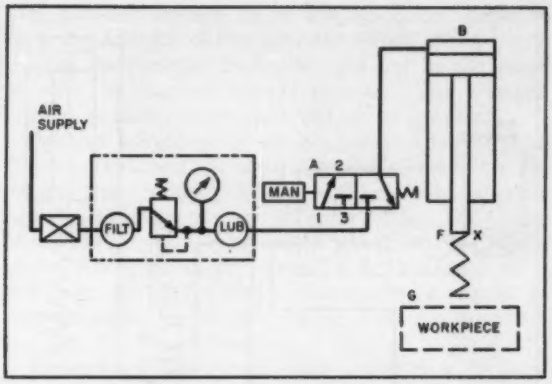


Fig. 1. Clamping device using single-action cylinder.

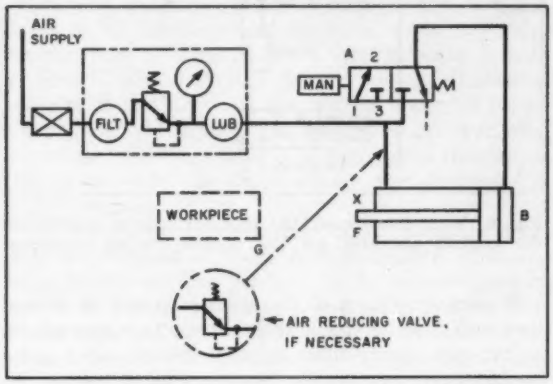


Fig. 2. System with 3-way valve, double-acting cylinder.

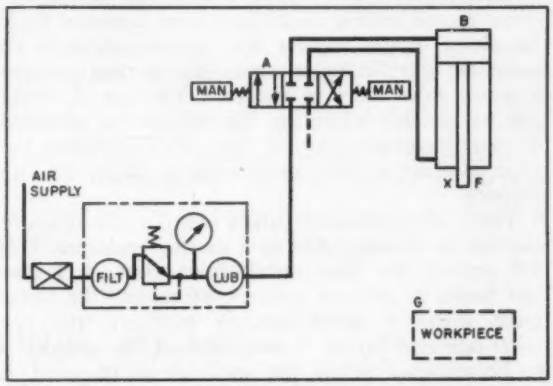


Fig. 3. Four-way valve stops cylinder at various points.

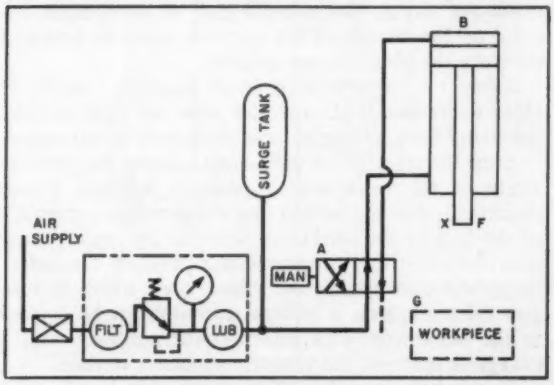


Fig. 4. Surge tanks store air for cylinders and air devices.

When the operator shifts the handle of three-way valve A in the circuit shown in Fig. 1, air flows from inlet port 1 through cylinder port 2 to blind end of single-acting cylinder B and piston moves clamp forward at a rapid rate clamping the workpiece. When work has been completed, operator shifts handle of valve A to original position connecting cylinder port 2 to exhaust port 3, and blocking inlet port 1. Air in the cylinder exhausts to the atmosphere and the spring pressure will return cylinder piston to original position.

A circuit similar to the first is shown in Fig. 2. This circuit also makes use of the three-way valve for control but it uses a double-acting cylinder for actuation. Note that a pressure line is taken off before reaching the three-way valve and that this line runs to the rod end of the cylinder.

This keeps pressure on the rod end of the cylinder at all times. Since there is an area differential between the back side and the front side of the piston due to the area of the piston rod, the piston will move forward whenever the three-way valve directs air to the blind end of the cylinder. Whenever the air pressure is released from the blind end, air pressure of the front end will rapidly return the piston to the starting position.

If the differential in force applied between the blind end and rod end is not great enough, the use of an air reducing valve in the line to the rod end as shown in the dotted-in section of Fig. 2 will provide a greater differential. This has a wide range of adjustment.

Advantages of the circuit shown in Fig. 2 are: pressure return, elimination of springs, and variable pressure control.

A disadvantage of both of these first two circuits is that there is no control during the work or return stroke of the cylinder. This means that the piston cannot be stopped at any intermediate point in the stroke. By using a four-way, three-position valve with one cylinder port plugged it is possible to stop a single-acting cylinder at intermediate points. Figure 3 shows how a double-acting cylinder is controlled by a three-position, four-way valve.

Using Air Devices?—Install Surge Tank

In an application where air devices such as clamps must complete the movement from the starting position to the workpiece in a very short time, the installation of a surge tank is a great help. This surge tank can be a simple affair with two ports and a drain connection. It acts as an air storage reservoir. When a greater volume of air than normally carried in the pipe lines is required it is readily available. The air is stored up in this tank when the cylinder is not cycling. Figure 4 shows a circuit using the surge tank. Often several cylinders and air devices are supplied by one surge tank. The size of the tank depends upon the volume required by the devices.

Safety becomes of paramount importance in some applications. Safety to the operator, safety to the workpiece and safety to the machine—all are important and should be considered in any application.

Figure 5 is a circuit that provides an operator with a certain amount of safety as long as he does not try to circumvent either of the controls. Sometimes it

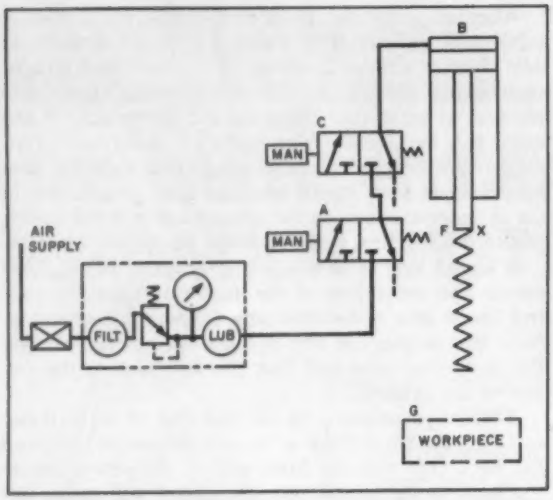


Fig. 5. Safety can be built into fluid power devices, as shown here, if operator doesn't try to circumvent controls.

requires all of the ingenuity of a circuit designer to outsmart the operator. Even though an operator knows that it is dangerous to tie down a control, many will still do it in order to increase production if he or she is working on an incentive.

Two three-way valves are used to operate the single-acting cylinder in Fig. 5. If either hand is released the cylinder port becomes connected to the exhaust thus allowing the spring to return the piston to the starting position. In placing the controls, make certain that they cannot be tripped by a bar or stick being placed against both at the same time. Also locate them so that they can be tripped only by the hands.

Another factor that must be taken into consideration is the accidental tripping of a valve from some outside source. As an example, a shop truck could accidentally make contact with a valve, if it was not properly located and protected. This *could* happen at the precise moment that the operator has his hand on one valve and under the press ram. Shields over the valve tripping mechanism afford added protection.

Safety Circuit Applications

A fool-proof safety circuit is shown in Fig. 6. With this circuit the operator cannot circumvent a control and still get the desired cycle. This circuit contains two three-way manually-operated valves, an air-pilot-operated, three-way valve, a cut-out valve and the single-acting cylinder. The purpose of the cutout valve is to permit fixed quantity of air to be passed on each cycle.

Whenever the given amount of air has passed through this valve it cuts out and stops any additional air from passing until the upstream air of the valve is exhausted. The predetermined amount of air that passes through the cut-out valve to the cylinder must be exhausted by some other means before another cycle takes place. Thus, the operator must actuate both three-way manual valves to complete a cycle. If the operator removes either hand from the controls, the cylinder piston will retract to the starting position.

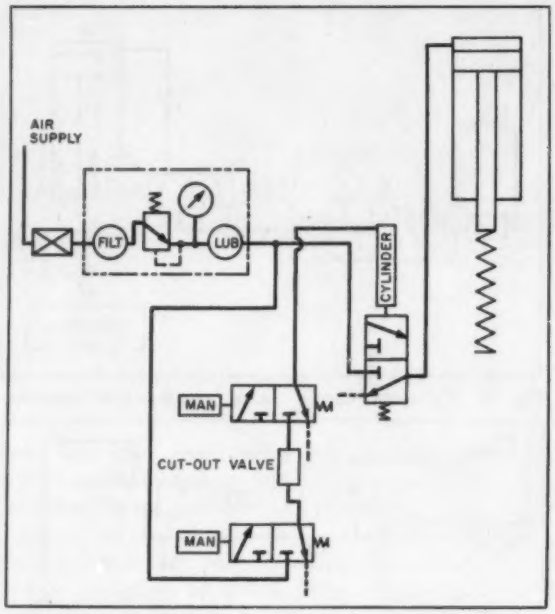


Fig. 6. With this circuit the operator cannot circumvent the control and still get the desired cycling operation.

If pressure return of the cylinder piston is desired then such a circuit should include two, three-way valves, a four-way, spring-offset valve, a cut-out valve and a double-acting cylinder as shown in Fig. 7.

Other circuits may be devised so that if the operator should remove either hand from a control valve the piston of the cylinder will immediately stop. To cause the cylinder to retract to the starting position a return valve must be tripped. This type of circuit also has another advantage: the tool can be advanced in short increments toward the workpiece during the setup in order to make certain that all factors line up properly.

There are applications where safety to the operator can best be accomplished by a moving enclosure. This will protect him from metal, flying glass, explosives and fumes as the tool makes contact with the workpiece. Figure 8 shows how the enclosure trips two roller-operated valves. If the piston of the cylinder is to be retracted before the enclosure is retracted, it may be wise to use electric-operated valves as it would make the circuit less complicated. A pushbutton located on the outside of the machine could be actuated to return the piston of the cylinder.

Safety to the workpiece is an important factor in plant operation. With material costs as high as they are today even scrapping one workpiece is expensive.

Even the simplest of pneumatic circuits can provide safety to the workpiece if properly applied. Power chucking is one application that requires rapid approach of the tool to the workpiece followed by rapid retraction. By using the movement and pressure created in the cylinder to operate the chuck jaws, which in turn grip the workpiece, a uniform pressure can be applied to the workpiece. This pressure will not vary until a change is made in the pressure regulator setting.

In manual operation of a chuck this is not true.

The pressure applied upon the workpiece depends upon the strength of the operator. When the operator is tired the pressure he applies will not be the same as when he has just started to work. The pressure applied by different operators will not be the same.

Another advantage of using a power chuck is that reserve movement is always available should it be needed; for example, if the workpiece should shift slightly due to clamping on an imperfection. The power chuck has the reserve movement to bite into the workpiece. Where a multiple operation is performed on a workpiece such as a heavy walled tube, a change in pressure during the work cycle, in order not to distort the tube, is often desired.

Figure 9 shows a circuit which is often used for dual pressures. In this circuit air flows through the filter and lubricating unit G on to air regulating valve D which is set at 80 psi. Regulated air passes from this valve to inlet port of valve B. When lever of valve B is in position C, 80 psi air then flows to rod end of rotating cylinder H and piston of this retracts under 80 psi on the rod end piston area. This causes the drawbar from the chuck to retract since it is fastened to the end of the piston rod. The chuck clamps the workpiece at high pressure.

As material is removed from the workpiece the operator shifts handle of Valve A to position R which directs the 80 psi line pressure to the plugged port of Valve A. The 80 psi pressure trapped in cylinder H is released as the rod end of cylinder is connected to sequence valve F through valve A. This pressure is bled off through valve F until it is reduced to approximately 35 psi; the operating pressure for the remainder of the cycle will stay at this pressure.

When the work cycle has been completed, operator shifts handle of valve B to position R and handle of valve A to position C. Thus, air pressure at 80 psi is directed to the blind end of the cylinder H. The air pressure on the rod end of the cylinder is then exhausted through valve A and B and the piston moves forward opening the chuck jaws.

Quite a range of pressures are available by adjusting valves F and E. Valve F should always be set at a pressure slightly higher than that of valve E. This will keep the pressure from bleeding off when the low pressure cycle is being used.

Versatility With Duplex Air Cylinder

By use of a duplex air cylinder (one cylinder actuated at one pressure and the second cylinder at a different pressure) a wide range of forces can be applied to the workpiece. This characteristic is highly desirable if one wishes to hold pieces which have both light and heavy wall sections. The lower pressure is, of course, to be applied to the thin wall section and the higher pressure to the heavy section. Such a set up is used not only for holding a workpiece but it has many other applications in solving production problems. Duplex cylinders are generally used where space saving is a factor and where different forces must be exerted close to one spot.

Machine safety is an important item and should be thoroughly considered when selecting the operating circuit. In Fig. 10 we make use of a four-way control which, in neutral position, will cause air pressure to be

Fig. 7. If pressure return of the cylinder is desirable the type of circuit shown here will perform the task well.

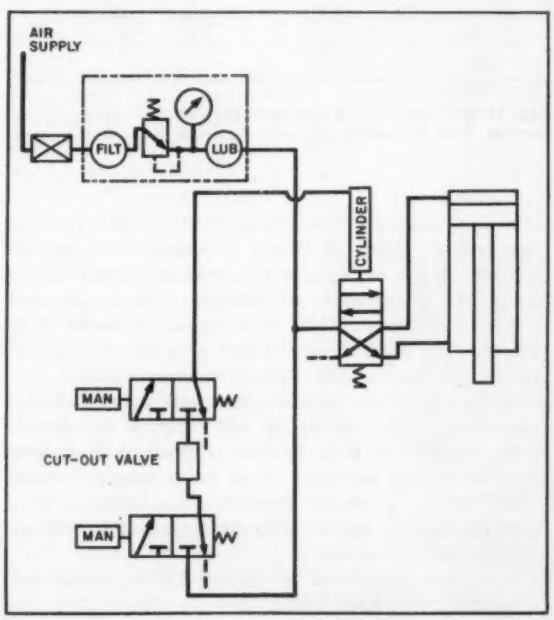
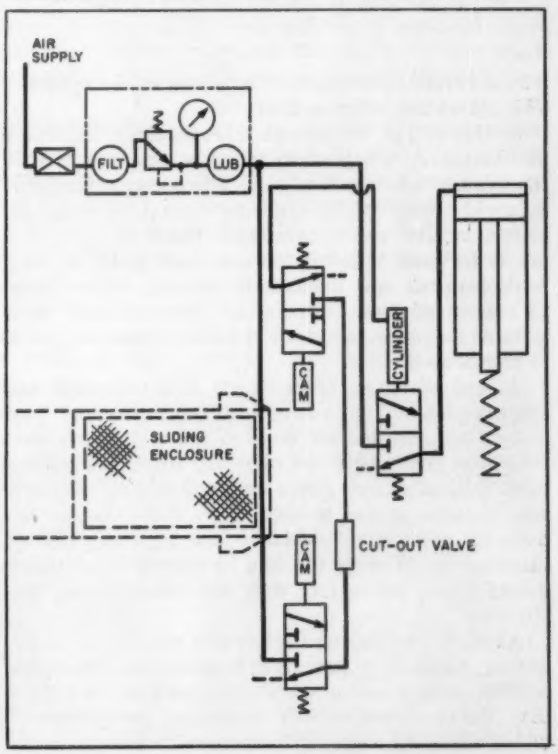


Fig. 8. Safety by means of a moving enclosure to protect operator from flying objects can be achieved like this.



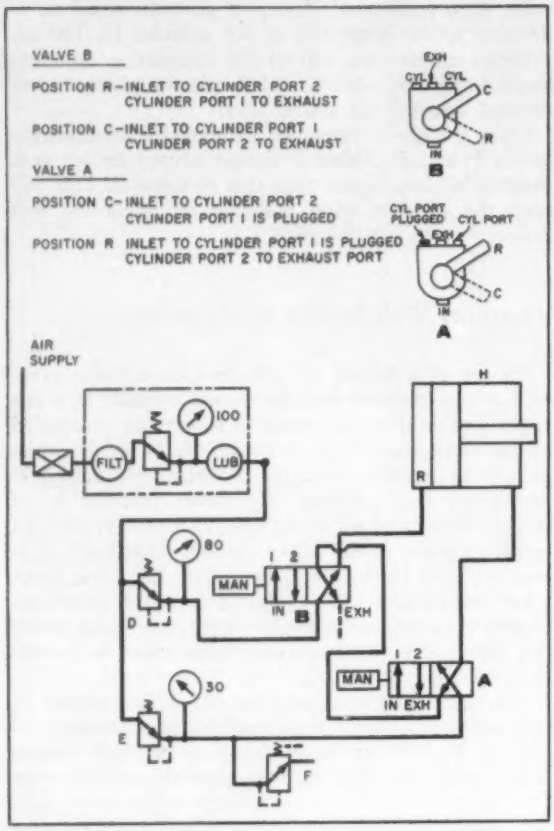


Fig. 9. When a multiple operation is performed on a workpiece a circuit giving dual pressures is desirable.

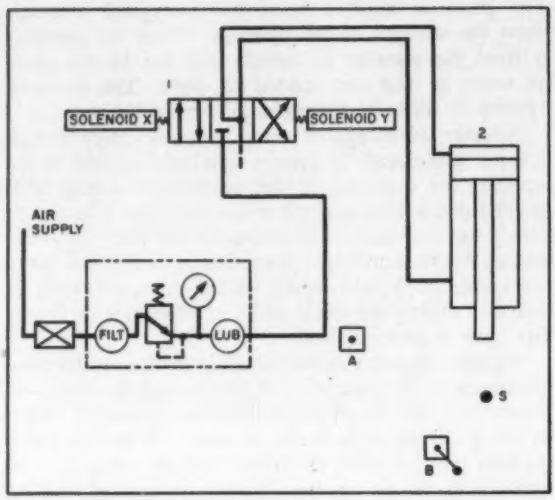


Fig. 10. A circuit of this type will provide the machine with a high degree of safety by air pressure release.

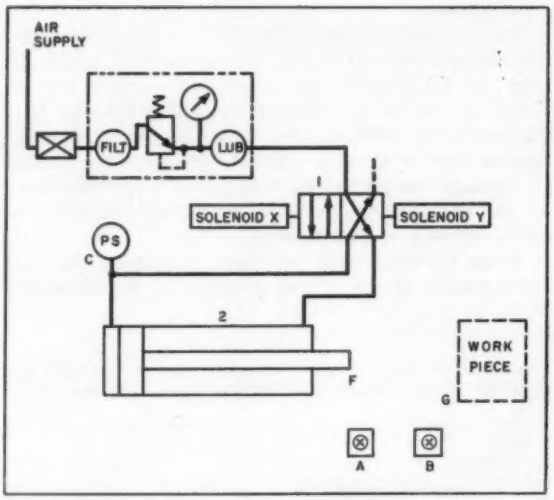


Fig. 11 Another safety feature, provided by this circuit, permits tool to return to start position if a jam occurs.

released from both sides of the piston in the cylinder. This allows the piston to float.

In this circuit the operator momentarily depresses pushbutton A which energizes a holding relay. This relay causes solenoid X of valve 1 to become energized. Solenoid plunger shifts spool of valve 1 allowing air to flow to blind end of cylinder 2. Piston of cylinder 2 moves forward. When piston rod meets point S, relay is deenergized and solenoid is released. Valve shifts to neutral position releasing air pressure from both sides of the piston. Mechanical means drives the piston to end of stroke.

At end of stroke, limit switch B is contacted and this energizes holding relay which causes solenoid Y of valve 1 to shift and air flows to rod end of cylinder. As piston approaches end of return stroke the holding relay is dropped out. This causes valve spool to center, and cylinder piston to stop, thus completing cycle. Such an application would be one in which the air pressure would move the tool to a certain point then a lead screw would take over and complete the outstroke.

Another application of safety to a machine would be one in which, if a jam should occur, the tool would automatically return to the starting position. In Fig. 11 the operator momentarily depresses pushbutton A which energizes solenoid X of valve 1. This shifts the valve spool and air flows through the valve on to the blind end of cylinder 2. Piston of cylinder 2 moves the tool toward the workpiece. If undue resistance is met during the movement air pressure closes pressure switch C. Pressure switch C energizes solenoid Y of valve 1. This shifts the spool and air is directed to rod end of cylinder 2 and piston returns. Valve 1 will naturally shift when cylinder piston reaches end of outstroke as pressure builds up and pressure switch will close. Pushbutton B is for use if reversal is desired anyplace during outstroke when no resistance is met.

Such a circuit can also be worked out by eliminating electrical devices and substituting sequence valves and pilot operated controls.

In the next article we will discuss feed approach and rapid retraction. **End, Part I.**

Fig. 1. Operator, using arc torch, cuts the hole in a 12-in. thick steel door.

Fig. 2. From reverse side, oxy-acetylene torch rough cuts center opening.

Fig. 3. Operator removes slag from the 10-in. diameter opening in hot cell door.

TORCH GOUGES HOLE IN THICK STEEL DOOR

Hot cell doors, 12 and 18 in. thick, were cut and plugged in less than a week

THE INGENUITY of a welding engineer transformed a tough, expensive alterations task into a time and money saving assignment at one of the country's nuclear research installations.

At the installation, two "hot cells" are used for remote study of radioactive materials. These are heavy-density concrete structures with walls two and three feet thick. Access is gained to each through large solid steel doors, which are lowered into the floor. The smaller cell has a door 12 in. thick, weighing 23,000 lb.; the larger one a door 18 in. thick, weighing 42,000 lb.

To provide easier access to the inside of the hot cells, it was decided to make smaller access openings, about waist high in the thick steel doors. By having these smaller openings in the hot cell doors, materials being studied for suitability for use in nuclear projects can be placed into or taken out of the hot cells without having to lower the entire door.

Bids were let to local job shops to make the necessary alterations. Cecil Cline, the welding engineer for Partsco Inc., decided that this job could best be done with an Arcair metal removal torch. An operator unfamiliar with the equipment, cut a 10-in. diameter hole in the smaller steel door to a depth of 8 in. This was done by making repeated gouges, one over another until the desired amount of metal was removed.

After this, operations were started from the opposite side of the hot cell door. Several pieces of metal were cut from the center of the access opening with a flame cutting torch. The oxy-acetylene cutting torch removed several large chunks of metal from the center faster than could have been done with the arc gouging torch.

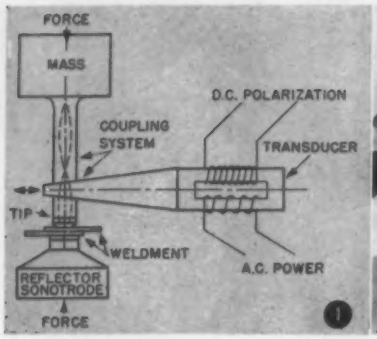
With the center removed, more accurate finishing cuts were made with the arc torch. The technique here was to "shave" away unwanted metal by making repeated gouges in a circular direction. This method permitted accurate control of the amount of metal removed.

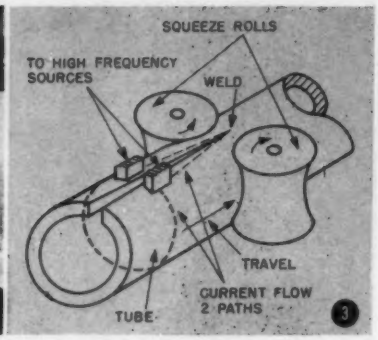
Since the air blast from the arc

(Continued on page 272)

Fig. 4. A stepped steel sleeve is welded in place and packed with lead wool.

Fig. 5. With door lowered, operator places a 240 lb metal plug in position.





WELDING - WHAT IS HERE WHAT IS AHEAD

By JOHN J. CHYLE, Director, Welding Research
A. O. Smith Corp., Milwaukee, Wis.

IN THE FIELD of welding research, we are striving to develop new welding processes, keeping in mind as our goal, lower welding cost operations and improvements in quality.

Here are developments in welding processes that have promise for the future. They are classified into three main groups: pressure, fusion and brazing; in addition, what to look for in automation, established welding processes and power sources.

PRESSURE WELDING

A group of related welding processes characterized by the use o f force as being of primary importance in obtaining the coalescence of metal, which usually is performed over the entire area of the abutting surfaces. Coalescence may be produced either with or without the application of heat.

Ultrasonic welding

What it is—Energy, usually elastic vibratory energy, to effect a weld is derived from the use of special equipment in the joining of metals, Fig. 1. Both spot and seam welding of sheets can be accomplished, Fig. 2. Similar and dissimilar metals, as well as bi-metals can be joined.

What is ahead—At present time limitations of this process are for the joining of light gage on thin sheet materials. Foil thicknesses can be joined readily, but there is some limitation as the gage or thickness of the sheets is increased. It is expected that further equipment developments will bring an extension of the range of thickness and applications will be expanded.

High frequency welding

What it is—High frequency electrical energy is used to obtain desired heating characteristics for welding. Process is applicable to a wide variety of similar metals; combinations of dissimilar metals have also been successfully welded. (Examples are shown in Figs. 3, 4 & 5.)

What is ahead—By utilizing high power density, the process results in high speed of use. Has good potentials for applications where high production, high-speed welding is important.

Foil seam welding

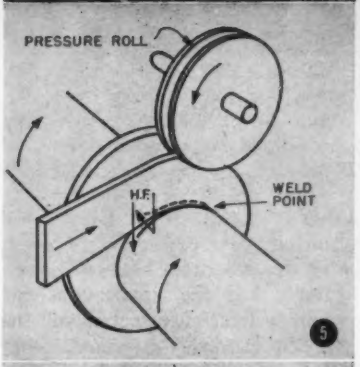
What it is—A resistance welding process for making butt type joints in flat strips or sheets, using a foil on both top and bottom surfaces over the butt joint. Foil strip is pressure welded into the fused area, Fig. 6. Has advantages of high speed of welding and freedom from distortion.

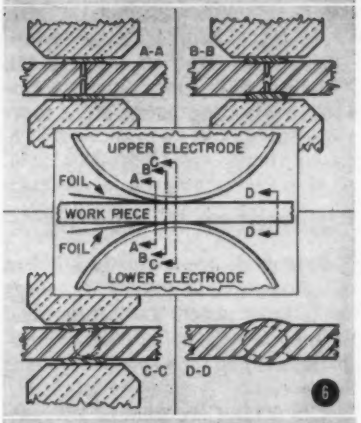
What is ahead—Process has wide future potentials because of lower finishing costs and dimensional uniformity.

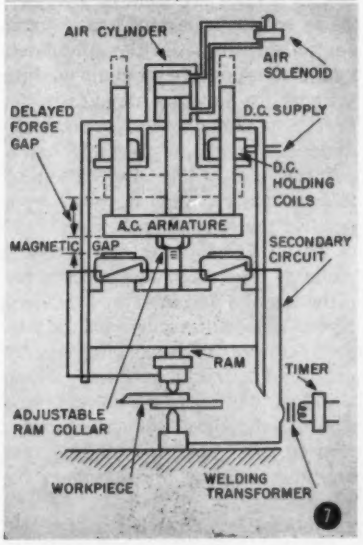
Magnetic force welding

What it is—Basic principle of the process is synchronization of the force or pressure by coupling this force with magnetic force, which is created by the welding current. Resistance welding machines in which electrode pressure is produced by an electro-magnet, which in turn is energized by the welding current, have been under development since 1946. Magnetic force welder is generally of conventional design and is of a direct-acting piston or ram-type spotwelder that has been designed to accommodate electro-magnets for the application of pressure, see Fig. 7. Advantage of process is that it can be used for welding high conductivity metals to each other and also to carbon steels. Many materials previously considered unweldable can now be successfully welded by the magnetic force welder.

What is ahead—The principle of magnetic force resistance welding







appears to have wide future application to many other resistance welding processes, such as projection welding.

Percussion welding

What it is—A resistance welding process in which the weld is made in an exceedingly short period of time over the entire area of the metals to be joined. Weld can be produced either by a rapid discharge of electrical energy from a stored energy type of power source, or by the rapid dissipation of current with a standard 60 cycle alternating current source.

What is ahead—Process may have applications in fabrication of ferrous and non-ferrous metals.

Friction welding

What it is—A pressure welding process wherein the principle of operation is based on heat produced by friction of rapidly moving parts under high pressure, see Fig. 8. Heat obtained is sufficient to cause fusion or bonding of the metal parts. A variety of similar and dissimilar metals have reportedly been welded. Limitation of process at present time is to parts that are cylindrical in shape and that can be rotated.

What is ahead—Some inherent advantages of the process may be found in low cost of power requirements and high speed of operation. Has interesting possibilities for special applications to production welding of simple sections, because of lower initial capital investment costs.

Thermo-pressure welding

What it is—A process that can be considered in the field of solid phase welding, wherein the parts to be welded are under continuous pressure, Fig. 9. Metal is heated until complete or partial plastic flow is obtained. Has found applications particularly in the joining of semi-conductors to such metals as germanium and silicon.

What is ahead—May solve many of the problems related to making contact to small areas without using chemical fluxes and melting in the fabrication of transistors and other semi-conductor devices.

Diffusion bonding

What it is—A joining method in which metals are heated to temperatures below their solidus temperature and held under pressure for some length of time. No liquid phase is formed and binding occurs by movement of atoms or intermetallic compounds across the interface on the surfaces, where intimate contact occurs. Process has been investigated only for combinations, such as gold and copper, nickel and copper, aluminum and gold.

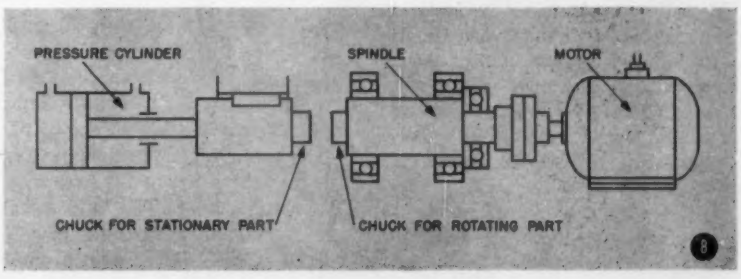
What is ahead—May find important applications in welding of special alloys where conventional processes are not suitable. Since the temperatures are low, previous heat treatment may not be altered; distortion and cleanliness can be controlled. With further information on fundamentals of the process, a wider application may be created.

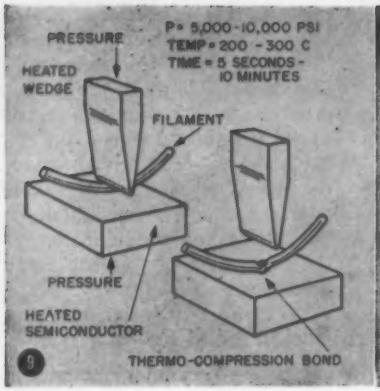
FUSION WELDING

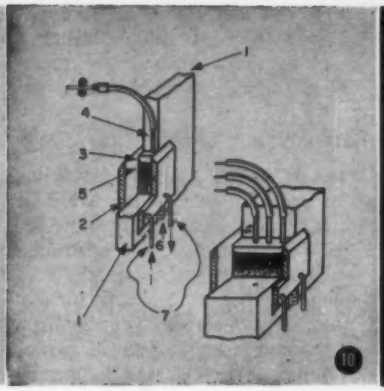
A group of related processes characterized by use of heat as being of primary importance in obtaining the coalescence of metal.

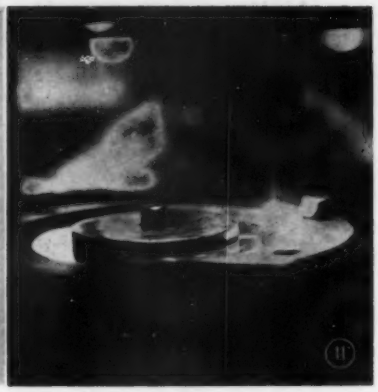
Electro-slag welding

What it is—Fusion of the electrode wire and the parent metal takes









place in and under a molten slag bath covering the metal bath from which the weld is formed, see Fig. 10. Primarily used for welding of heavy sections, it can be used for welding plates ranging in thickness from 2 to 12 in. or more. A Russian development.

What is ahead—Process is so new in this country that the application for industrial use may require further investigation. May have definite application for making butt joints in large weldments, such as presses and also for welding build-ups on large surfaces.

Electron-beam welding

What it is—Principle of operation is based on the impingement of electrons on the work piece in high vacuum, Fig. 11. Equipment is shown in Fig. 12 & 13. Electrons are emitted from a tungsten wire filament and are given a high degree of acceleration and velocity by a high-voltage potential between the cathode and anode, the electrons moving from the cathode to the anode. The work piece is the anode. High purity is distinct advantage—the level of atmospheric impurities is less than one part per million. Deep penetration is another advantage. Many metals have been successfully welded.

What is ahead—Since welding is performed in a high vacuum, the welding of large structures would require special, large installations and fixtures. However, theoretically there should be no serious limitations for the process. With increased use of the reactive metals, the process should find wide applications and further developments can be expected.

Arc plasma

What it is—Basic principle consists of passing a gas—usually the inert gases, although nitrogen and hydrogen can also be used—through a chamber in which an arc is maintained, see Figs. 14 & 15. The flow of electrons from the cathode to the anode ionizes the gas and the resultant bombardment causes the gas to be heated to extremely high temperatures. The ionized gases are forced through a nozzle opening so that the heated gases have the appearance of a flame emanating from the end of the chamber. Plasma can be defined as any material that is heated to extremely high temperature and is in the ionized condition. A plasma flame is 5000 F to 30,000 F.

What is ahead—At the present time the arc plasma has been developed primarily as a source of heat and, while some equipment has been developed for metal and ceramic material deposition, the process has a vast potential for future applications for fusion welding of metals. Production of extremely high temperatures is one of the important advantages.

BRAZING

What it is—Can be defined technically as a group of welding processes wherein coalescence is produced by heating to suitable temperatures above 800 F, and by the use of filler metal having a melting point below that of the base metals, see Fig. 16. The filler metal is distributed between the closely fitted surfaces of the joint by capillary attraction. Flux may or may not be necessary, depending upon the method of heating and metals to be joined.

What is ahead—It is likely that further developments in brazing alloys and procedures will continue, and the applications for joining light gage metals will increase, especially those metals that are difficult to weld by any other process. The future appears promising for marked improvements in design for brazing, as well as improved brazing materials and techniques.

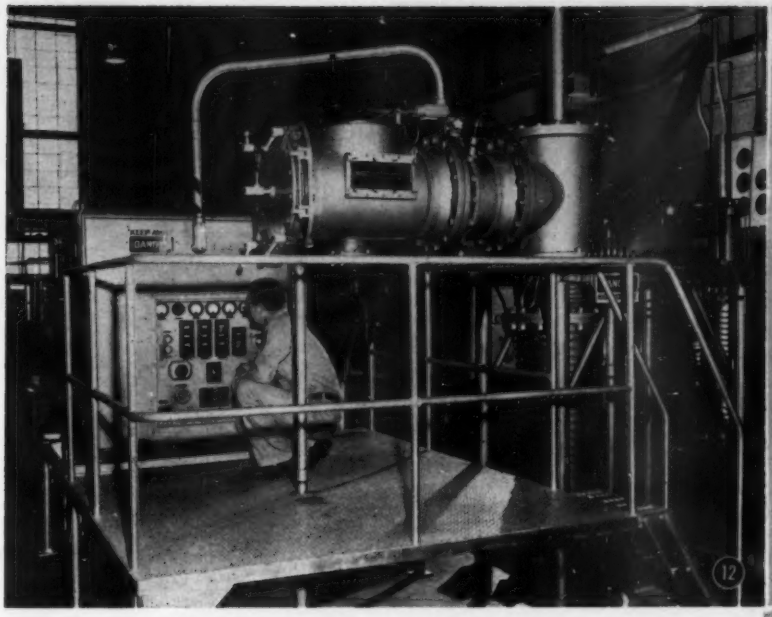
Automation In Welding

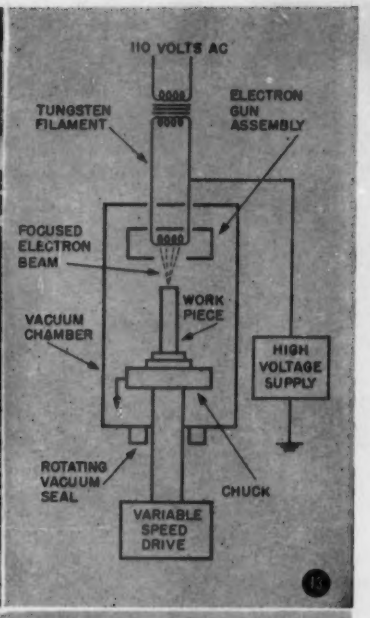
Further developments in the field of automation in joining of metals are to be expected. The future trend will be for more application of automatic welding processes to reduce labor costs.

The field of arc welding by automatic welding controls and welding equipment will be further stimulated by the adoption of automatic guiding systems for locating the arc in its proper position. Developments in automatic arc welding have reached a point where further application of this process can only be made by a positive method of guidance.

Several new automatic guiding methods have been developed. One is the use of a magnetic tape memory type of device that will index the correct position of the welding arc by means of a tracking device, which will direct the arc to the correct position. As the speed of welding is increased, the automatic guiding system and fixturing are necessary requirements.

Another method of automatic



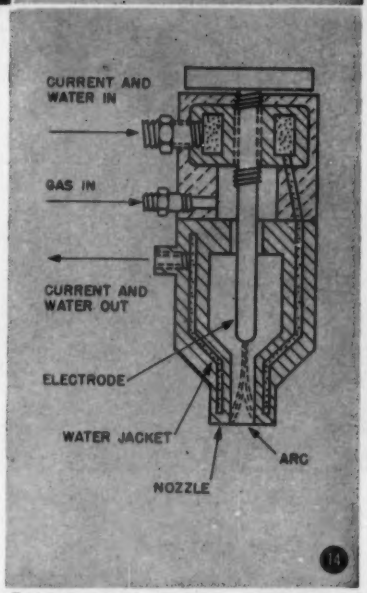


guiding is based on the potential differential that exists between the arc and the surrounding metal. A method has been developed which utilizes a minute voltage drop between the arc position and a reference base location in the parent material, so that this small voltage change can be utilized to guide the position of the welding arc.

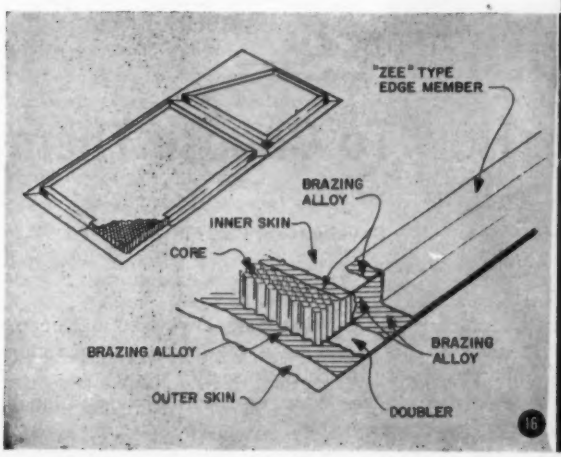
This method has been developed and will undoubtedly have applications for fully automatic arc welding. By automatic guiding, welding can be performed in irregular sections at high speeds.

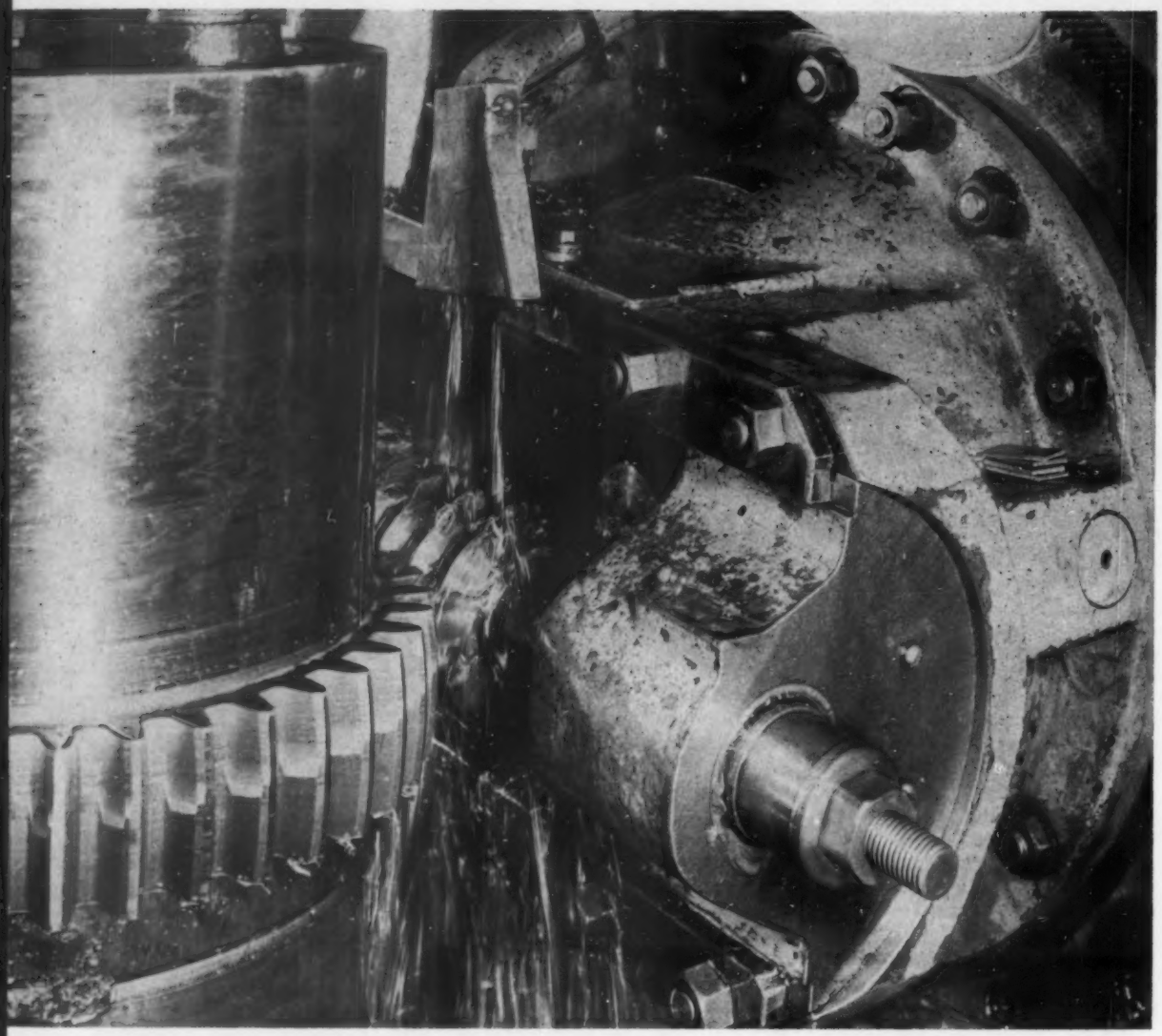
We can also depend on new developments in many of the established welding processes such as the metal-arc coated electrode process, where we expect some radical improvements in quality and performance of the covered electrodes. These improvements will be in the low hydrogen type of electrodes, that will be non-hydroscopic and can be used without the present precautions with regard to storage.

Welding power sources will also be radically improved in the future, as to their use in the various arc welding processes. It is also expected that in the field of resistance welding, improvements will be made in the speed and quality of the welds as well as in the applications of these processes to the welding of dissimilar metals. **End**



Photograph: Courtesy Welding Engineer





Sulfurized-mineral cutting oil is used for high precision gear hobbing in face of extreme heat generated by shock loads.

CUTTING FLUID ADDITIVES—

Where To Use Them, How To Choose Them

By ROBERT A. FITCH, Marketing Technical Service Div., Gulf Research & Development Co., Pittsburgh, Pa.

IN RECENT YEARS efforts have been directed at extending the range and increasing the efficiency of a decreasing number of cutting oils by use of additives.

In order to choose a suitable cutting oil with the best additive, for any particular job, our petro-engineers must answer three basic questions:

What material is to be machined?

What is the machining operation to be performed?

What type of tool material will be used?

Within these categories are a host of variables which must be reconciled in order to make the choice of cutting oil. When the questions have been answered, the over-all requirements of the job can be evaluated.

First, let us consider the basic questions. What about the material to be machined?

Identification as carbon steel, stainless, wrought iron, aluminum, copper alloy, titanium, nickel alloy —or others in the twelve major classifications—is not enough.

Each of the major groups has sub-divisions—variations of the basic material for special applications. Arriving at an accurate machineability index for the material involves consideration of grain structure and size, hardness, and other important characteristics.

Its metallurgical condition—the result of heat treating or working—must be considered. Is it annealed, tempered, carburized, or age-hardened; or is it cast, forged, hot-rolled, cold rolled, or cold drawn?

Chemical composition of the material is also involved—the proportion of carbon, manganese, silicon, sulfur, phosphorus, chromium, and nickel, among other elements.

Next, our engineer must have answers to the second question: what machining operation is to be performed?

What Machining Operation?

The number of different machining operations in use industrially today amounts to several hundred. They are variations or combinations of five simple types: drilling, turning and boring, planing and shaping, milling, and grinding.

The more common operations are internal and external broaching, tapping and threading, gear making, reaming, deep drilling, milling, multi-head boring, multi-spindle bar machining, drilling, planing and shaping, turning, and sawing. Grinding will duplicate any metal cutting operation except drilling.

Each of these operations projects a certain image. Heavy turning, for example, may be an "excessive heat" image—an operational trait which may be intensified by the customer's need to use tough machining material. This in turn will suggest a cutting oil formulated primarily for efficient cooling in a wide range of operations and for a broad group of materials.

The third question is an extension of the second: what tool will be used?

We need to know which of five basic tool materials is involved: carbon steel, high-speed steel, cobalt-base high speed alloys, cemented carbides, or cemented oxides or ceramics.

The shape, or "profile," of the tool enters the analysis, because tool engineers establish tool angles to provide optimum cutting conditions and to control the effect of metal build-up on tool edges. The build-up is part of the worked metal that has welded to the tool tip and become hardened through heat and working.

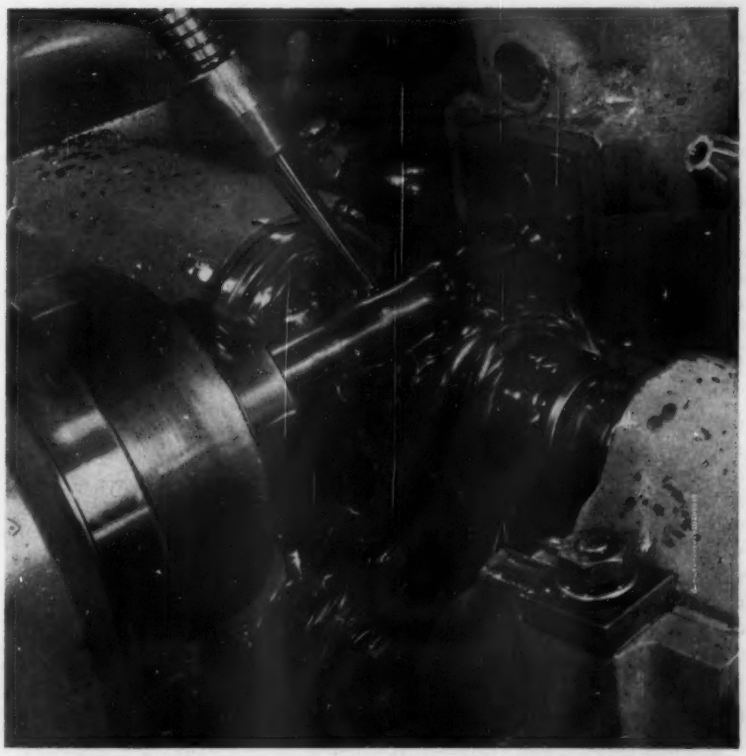
This built-up edge can be either helpful or detrimental—depending on the way it affects rake angles. If it keeps breaking off, it will mar the workpiece surface with rough spots. But a slight built-up edge will protect the cutting edge and will help to prolong tool life. A proper cutting fluid, together with the right cutting speed and tool angles, can control the built-up edge to give maximum tool life.

When the petro-engineer has answers to these three basic questions he will evaluate over-all requirements of the job and check these against the performance values of about seven basic types of cutting oils.

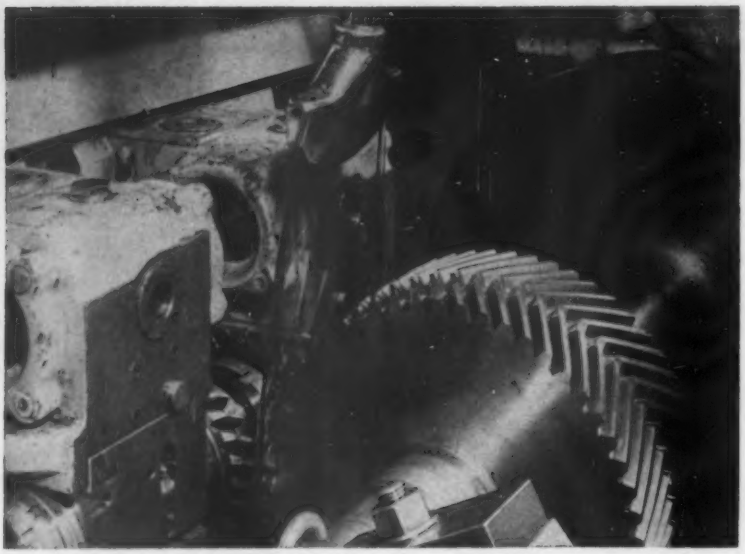
When we have the answers to these questions, we can consider the cutting oil itself. A cutting oil does three important jobs:

First: it must act as a lubricant. By reducing friction it cuts down on the heat generated. Second: because frictional heat cannot be completely eliminated—and often, not even substantially reduced—the cutting fluid must act as a coolant. Third: it should act as an anti-weld agent to counteract the tendency of the worked material to weld to the tool under heat and pressure.

It is in this third function—anti-weld activity—that additives play their most important role in cutting oils. The additives most commonly used are elemental or combined sulfur, and combined chlorine. Both sulfur and chlorine react with metals under the temperatures and pres-



Production of rifle bars was doubled by using sulfurized-mineral cutting oil.



Right cutting oil prevents welding of chips, will help hold close tolerances.

sures encountered at the tool point to form chloride or sulfide surfaces.

These offer low resistance to cutting, and result in lower torque and power requirements, lower temperatures, and longer tool life.

The basic types of cutting oil—specifically designed to handle any combination of the materials, operations and tools referred to above—are as follows:

Mineral Oils

These are occasionally used as cutting fluids today. Greatest present use for a straight mineral oil is for blending cutting oil bases. They are also suitable for light-duty machining of free-cutting ferrous metals, and non-ferrous metals where requirements are not severe.

Fatty-Mineral Oils

Combinations of one or more fatty oils blended into straight mineral oils to cover a range of viscosities are used extensively in automatic screw machines where operations are not exceptionally severe and where high surface finish and precision finish is required. Non-corrodible to both ferrous and non-ferrous metals, they are desirable in machining copper and its alloys.

Chlorinated-Mineral Oils

Because chlorine gives mineral oil excellent anti-weld characteristics, these materials have proved especially valuable for machining soft draggy metals, with low machineability ratings, and in some machining operations such as drilling, milling or turning, on stainless steel. In anti-weld qualities, chlorinated oils are essentially the same as sulfurized oils, except that chlorine is generally considered to become effective at lower cutting temperatures.

Chlorine reacts to form solid lubricant films, iron chlorides, which retain their effectiveness to temperatures approaching their melting points of aproximately 1100 F. Sulfur reacts to form iron sulfides with melting points of approximately 1800 F, which are also solid, low-shear films interposed between the tool chip and workpiece.

Sulfurized-Mineral Oils

Sulfur added to mineral oils increases their cooling and lubricating qualities, and helps prevent welding of chips. Such oils are useful for general and severe machining operations—turning, drilling, threading, broaching—on tough metals of high ductility.

Sulfurized-Fatty-Mineral Oils

The excellent anti-weld characteristics and lubricity of sulfurized-fatty-mineral oils are essential where cutting pressures are high due to a tough, draggy workpiece and where tool vibration is likely to be excessive. These oils will permit fine finishes on materials which are difficult to machine by preventing build-up welds on the tool which cause poor surface finish and score marks.

Sulfo-Chlorinated-Mineral Oils

Superior anti-weld characteristics of sulfo-chlorinated-mineral oils prevent excessive build-up and make longer tool life possible. These oils are excellent in threading soft, draggy steels.

Because the chlorine in sulfo-chlorinated-mineral oils takes effect at a lower temperature than sulfur, due to a lower melting point for iron chlorides than for iron sulfides, this combination is employed where anti-weld and pressure resisting qualities must cover a wide range of cutting temperatures. Heavily compounded cutting oil bases usually belong in this classification.

Emulsifying Oils

Emulsifying oils are mineral oils containing emulsifiers to make them dispersible in water. As cutting fluids, emulsions combine the coolant properties of water with the lubricating properties of oil. They provide a light, friction-reducing film between the tool and work, and they conduct heat away rapidly.

Because of their coolant-lubricant properties, emulsions are used in operations having high cutting speeds and low cutting pressures, accompanied by considerable heat generation.

Manufacturers of cutting fluids supply emulsifying oils as concentrates that the user prepares for service by mixing with water. Mixtures range from 1:100 to 1:5 oil-water ratio, depending on the severity of the operation and whether the primary function is cooling or lubricating. Leaner emulsions are used for lighter machining operations and where cooling is the essential requirement—as in grinding. Rust prevention properties increase with higher oil concentration, and this is another way of determining the oil-water ratio for a particular operation.

Within these basic categories are individual compounds tailored to cover all metal cutting requirements, with a minimum number of grades to be stocked, and minimum on-the-job compounding. **End.**

Building-Block Tools Widen Horizon for...
ELECTRICAL DISCHARGE MACHINING

THIRTY-THREE building block tools, all for electrical discharge machining made a recent debut at Cincinnati Milling Machine Company. The tools are built up mostly from only 16 basic units. Many of these building blocks are completely interchangeable. They are not components taken over from other machine tool lines.

The basic line consists of tools of a single base and column on which may be mounted four interchangeable workheads and four different base units. The choices of workheads are: non-rotating, rotating, universal, and ram type. Each of these workheads may be matched with any of the four tank types, namely: solid, open-front, disappearing, and movable table.

The process employs, of course, high energy sparks which jump between an electrode and a workpiece under controlled conditions. The sparks erode the workpiece and thereby duplicate the shape of the electrode. The surface of the electrode is also subject to erosion, but at a much lower rate.

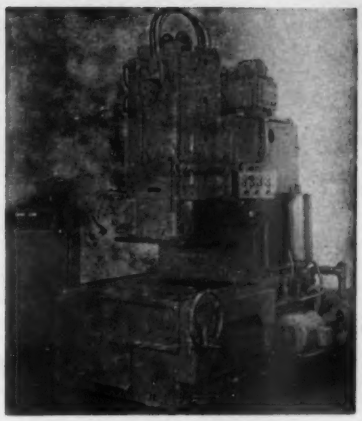


Fig. 1. Die sinking machine is equipped with vertical ram-type workhead.

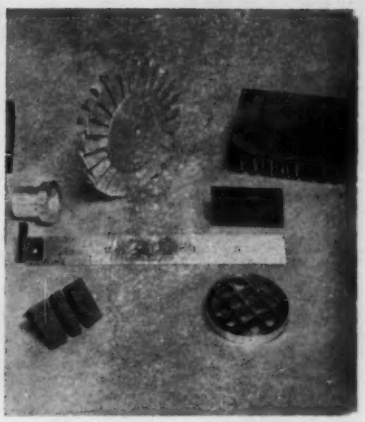


Fig. 2. Some samples of work performed by electrical discharge erosion.

An electrode never touches the workpiece. But anywhere from 10,000 to 250,000 times a second, sparks flash from it to the workpiece across a gap of about 0.001 in. Workpiece and electrode are bathed in a dielectric fluid so quickly quench the sparks and wash away the debris.

Cavities of 50 cu in. are now being machined at metal removal rates of as much as 0.016 to 0.018 cu in. per min. Die blocks up to 18 in. thick can be handled by the large die sinking machine.

Large die cavities are being sunk with dimensional accuracy of ± 0.005 in. from the desired form. On smaller applications ± 0.001 in. accuracy is typical. **End**

Fig. 3. A die-cast electrode for Elektrojet machining.

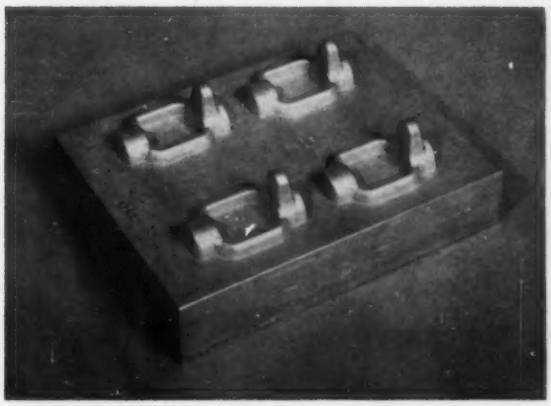
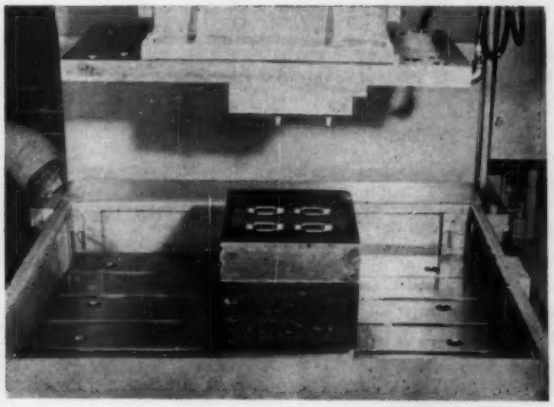


Fig. 4. Forging die was sunk with die-cast electrode.



STEAM FACILITIES ISOLATED . . .

Layout answers Caterpillar's needs for heating and cooling. Here are some of the features

By P. B. PETTY, Project Engineer, The H. K. Ferguson Co., Cleveland

Fig. 1. The outside work was still not finished when this shot was made, although plant was already being put to use.

SERVING OVER TWENTY-NINE acres of plant space on a single floor and under one roof, as well as offices and eleven other buildings, the heating plant at the recently built Caterpillar Tractor Co., near Aurora, Illinois is an example of modern industrial design.

Choice of the heating plant location, with respect to the other buildings, is such that plant expansion is possible, good railway and truck access is provided, fuel storage almost unlimited, and yard piping minimized.

In designing this heating facility, stress was placed on the wish to operate with a minimum number of personnel. This was successfully accomplished in line with good practice that assures sufficient supervision to guard adequately against human failure.

All drives are electrical with the exception of three of the four boiler feedwater pumps. These are driven by steam turbines whose exhaust provides the bulk of the low-pressure steam for the hot-process water softener system.

Both steam and compressed air are produced and distributed from the heating plant building. This is in line with design policy of minimizing supervisory requirements.

The heating plant is fittingly named as a very large portion of the steam demand is for winter heating. Because the size of the main manufacturing plant amounts to so many acres of floor space, this can be understood. In order to ventilate and heat such a large plant area, a system of seven penthouses has been provided. See Fig 6. Each of these penthouses contains custom-built air handling units which condition, heat and recirculate the air, as required, over an average four and a half-acre portion of the manufacturing area. These penthouses also serve as locations for electrical power substations.

Refrigeration for summer cooling is produced by an absorption unit. See Fig. 4. Size of unit is 635 tons using 12 psig steam at an average of 20.4 lb/hr/ton of refrigeration produced. The absorption refrigeration unit is self-contained, of a completely sealed type, using water as the refrigerant, lithium bromide salt solution as the absorbent, and steam as the heat source. It is completely automatic in operation and is capable of handling 1605 gpm of chilled water between 52.5 F and 43 F for the plant offices and the front administrative office areas.

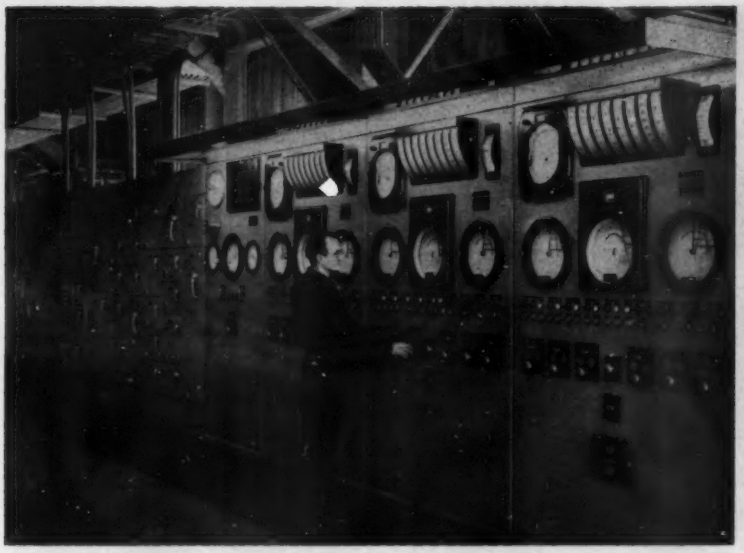


Fig. 2. Master control panel is located at the left of the three identical boiler panels. It includes a Panalarm unit which provides some visual alarm signals.

Fig. 3. Steam is supplied to the main building through underground passage.

Coal is unloaded for plant storage and use by either truck or hopper-bottom coal car. The fuel is dumped into a track hopper where it is picked up by a feeder conveyor and a belt feeder and carried into the building where it is sized; oversized lumps can be passed through coal crusher to supply 1¼-in. minus size fuel. A bucket elevator is used to lift the coal and distribute it, by means of a shuttle conveyor, for storage in three conical bunkers.

Stokers are of the mechanical spreader type, each equipped with three feeders and approximately 150 sq ft of active traveling grate surface. Heat release at maximum, continuous rating of 87,000 lb per hr, 150 psig saturated steam is 630,000 Btu per sq ft of grate area. This is based on the burning matter of one and one-quarter-in. minus size coal having 16 per cent moisture, 35 per cent volatile, 40 per cent fixed carbon and nine per cent ash for proximate analysis, 10,600 Btu per lb, 2000 F fusion temperature, three per cent sulfur.

The steam generators, are two-drum, high-head units with water-tube furnace walls and economizers. Each unit is designed for a continuous rating of 87,000 lb per hr, a two-hr peak capacity of 97,000 lb per hr; a minimum load on automatic control of 22,000 lb per hr.

The ash handling system provides for removal, transportation, storage and dustless unloading of both fly-ash and ashes from each boiler. Removal of fly-ash is from hoppers

Fig. 4. Some of the plant steam load in the summertime is credited to this 635 ton absorption unit. It will take up to 12,954 lb of steam per one hour's work.

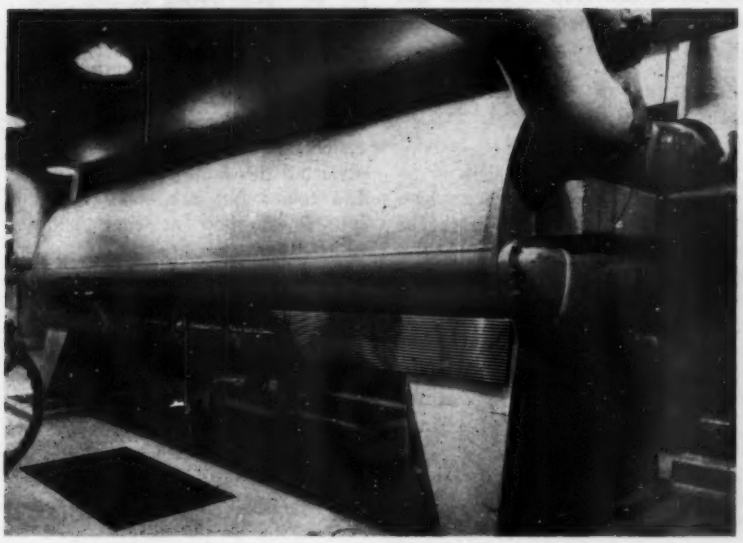


Fig. 5. Battery of pump and motor units supplies chilled water to plant.

Fig. 6. Internal view of one of the seven penthouses. Each of them has two large chambers for tempering outside air.

of the mechanical dust collectors. Ashes are taken from the front boiler ash pit and also from the stoker hopper on each boiler. This is a dry system, steam operated with a storage capacity of approximately 40 tons of dry-ash and fly-ash. Storage and unloading equipment is located within the building, minimizing possibility of freeze-up.

The ash handling system is capable of conveying the furnace refuse from both the boiler ash pits and the fine fly-ash from the boiler, economizer and dust collector hoppers. All this material is delivered to an elevated tile ash bin through an entirely enclosed system that is located, for the most part, in covered trenches in the heating plant basement. System is equipped with a steam jet exhauster which operates on 150 psig steam. When in operation, the exhauster creates a vacuum on the system, including the storage bins. This conveys the refuse to the bin storage. The exhaust air is discharged at the elevated bin location but is thoroughly washed before discharge to atmosphere.

Bin for storage of the ash is inside the heating plant to assure ideal storage conditions and to eliminate any likelihood of freeze-up during the cold season. Because the ash is delivered in a loose and dry condition, there is little chance of bin clogging.

Removal of Ashes

Removal of stored ashes is by means of a rotary unloader which controls the feeding rate from the storage bin. This unloader discharges into a powered, rotating mixing drum where water sprays onto the ash at a controlled rate, and longitudinal scraper bars mounted in the drums thoroughly mix and dampen the ash so that it can be loaded onto trucks with the least amount of trouble. By operating with a minimum of water, truck unloading is not a problem for short length hauls in cold weather as the ash is kept at room temperature in storage and remains reasonably so during truck loading, hauling and unloading.

The plant water system includes water for the plant fire protection system. To assure an adequate supply of water during normal operation and for fire fighting, a 300,000 gal capacity, elevated water storage tank, 125 ft high, is included with a fire water reserve of 200,000 gal. The potable water and fire water systems obtain their source of supply from the same 1000 gpm wells and tower but are separate with suitable hookup at each supply source to meet fire underwriters' requirements. Average potable water daily consumption is 400,000 gal with a peak daily consumption of 530,000 gal.

Water treatment equipment is designed for 533 gpm capacity when handling 24,000 gal per hr condensate and 8000 gal per hr of raw makeup with a total hardness of 258 ppm as calcium carbonate. A hot process softener was selected

with three pressure filters, single 240 gpm backwash pump, chemical feed equipment with flowmeters and chemical feed pumps.

The instruments and controls for the plant have been selected and planned for furnishing an adequate plant record of operation and operating costs. See Fig. 2. The controls have been provided to enable the plant to operate with a minimum of personnel consistent with good practice. This has been accomplished by the use of conventional regulator and control equipment which has been designed to be an integral part of each particular piece of equipment or operation.

Instrumentation and control board is comprised of both instruments and controls for normal boiler operation and electrical motor control centers. The controls and instruments comprise a complete pneumatically operated system for combustion and draft control. Equipment has been shop-preassembled on panels; instruments and control devices were mounted in place with all necessary panel wiring and panel piping. All recorders are 24-hr chart type, 110-v, single phase, 60 cy electric motor driven.

Master Combustion Control

There is one control system, for example, for the feedwater control of each boiler. However, the plant does have a master combustion control based on steam pressure. Operation of the heating plant equipment is from the single, central control panel in front of the three boilers.

The boiler loads are primarily controlled from a single pressure-sensitive master controller which is capable of 100 per cent load range with not more than two per cent change in pressure from the desired average pressure. The output signal from the station master controller is transmitted to the submaster controller for each boiler. Each submaster is capable of manual control (base loading) of its individual boiler and is also capable of bias adjustment to vary the per cent of total load to be carried by the individual boiler when operating under control of the station master.

The output from each boiler submaster is transmitted to control fuel and air selectivity for coal. The impulse from the submaster is transmitted simultaneously through a ratio controller to position the fuel feed control lever and the forced draft fan inlet control lever to effect parallel position control of these two levers. The ratio controller is capable of bias adjustment to permit manual changes in position relationship from the panel.

Control of overfire air and stoker grate speed is manual by mechanical means provided as part of the stokers. Draft regulators for each of the three boilers maintain fixed furnace draft within plus or minus 0.05 in. water column with load swings of 20 per cent per minute and are sensitive to draft changes of 0.005 in. water column. These draft regulators are also remote and manually operated from the panel.

Instruments for the master section of the panel board include a pressure recorder for the main steam header and feedwater header pressure; master controller; panel alarm unit with visual signals for all critical equipment and alarm horn to serve all sections of the panel. This section of panel also contains gages for steam header pressure and feedwater header pressure. Pushbutton stations are also located on this panel for instrument air compressor and electrically driven boiler feedwater pumps. **End**

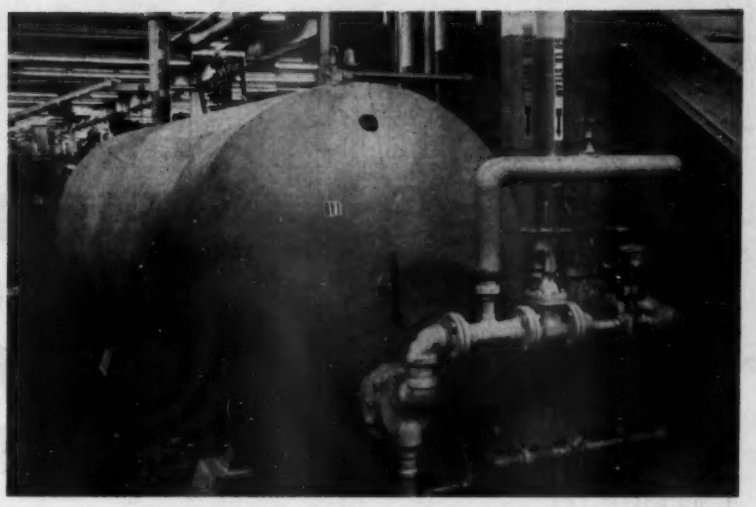


Fig. 7. One of several steam-heated hot water storage tanks in main building.

Fig. 8. A standby 350 kw diesel-generator unit is located in the boilerhouse.

FROM HEAT TO QUENCH IN JUST SEVEN SECONDS

New building, new layout, new handling equipment, new tanks designed by plant engineering department

By U. C. ROSSI, Staff Assistant,
Plant Engineering, Santa Monica Div.,
Douglas Aircraft Corporation

A STREAMLINED FORMING and heat treat department has efficiently increased production, relieved internal transportation bottlenecks, and resulted in important time and material savings at the Santa Monica Division of Douglas Aircraft Company, Inc.

During the war years, when space was at a premium, many practices developed that would never have been tolerated under normal peace-time operation. Then, because the equipment was in place and the processing was in operation, even though at inconvenient locations, the pressure of post-war business was such as to delay any change.

An example of a Topsy that just grew the best it could, was the case of aluminum "hat" sections. Hat sections are structural members whose cross-section resemble a derby, or a high hat, or even a straw skimmer—various shapes. All of them must be cleaned, be heat treated, quenched, straightened and then hardened in an aging oven.

The hat sections are rolled from flat stock or rolled strip stock and this was done at Santa Monica plant

Fig. 1. Plan and elevation views of the salt tanks and water quench tanks. Timing sequence at bottom of drawing shows time, in seconds, for various parts of quench operation.

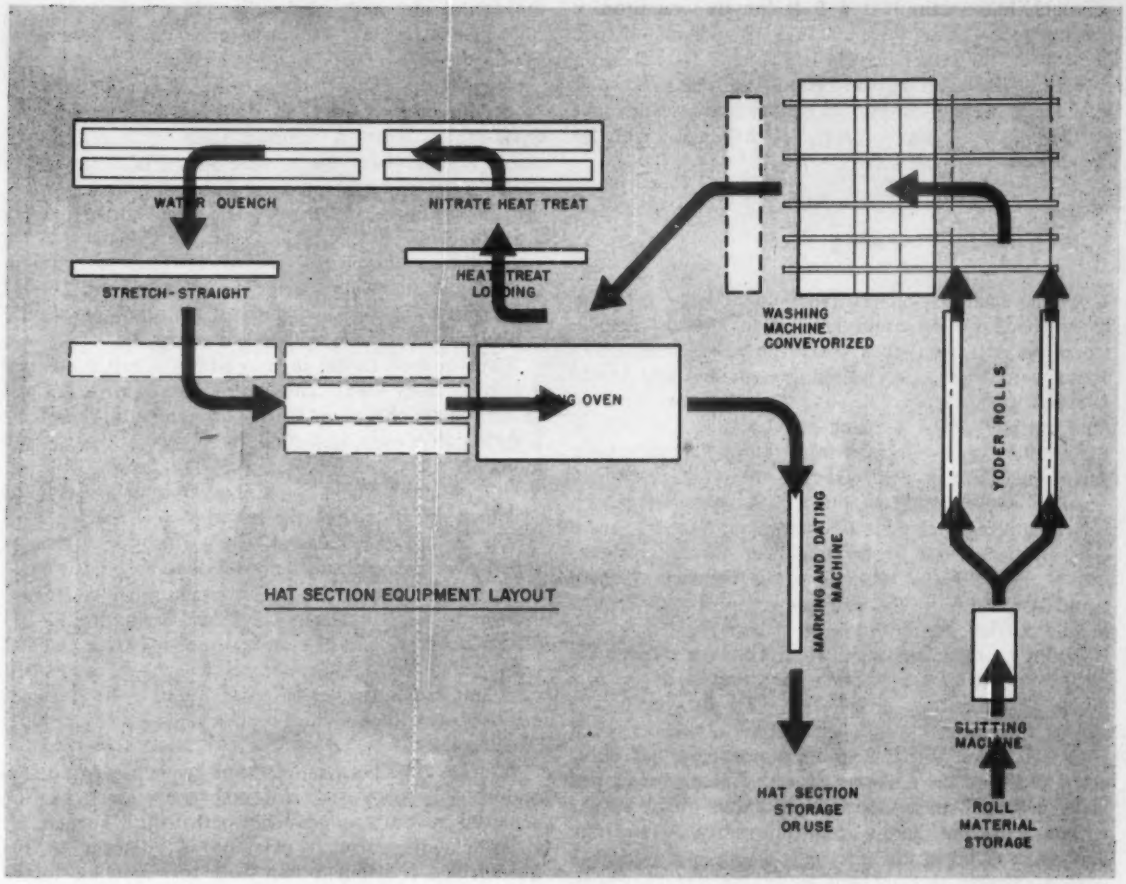


Fig. 2. This schematic diagram of aluminum "hat" section equipment layout shows uninterrupted flow of product.

on Yoder rolls at one end of a ½ mile long manufacturing shop. And here the joker was dealt into the system at the beginning.

Hat sections were specified by length and hat contour. They might be from 5 ft up to 20 ft long (they couldn't be longer because equipment at the end of the war would not handle anything longer than 20 ft.) Rolled sheet stock of the correct developed width was bought or, if the lengths were less than 12 ft, the proper width was sheared from flat stock and the material was cut to the required hat length and run through the rolls.

The grease used in rolling the sections was then removed at a degreasing location some distance from the rolls. As the degreasing equipment was used by other departments whose tonnage was considerably more than the hat sections, it was the hat sections that had to travel. This degreasing was a manual operation because of the variable length of the sections. Degreased sections were loaded also manually into long tote boxes with little attention given to the length of the parts.

Because the degreasing was a shared operation, the bottlenecks began there. Aisles from the rolls to the finished stock bins were generally crowded and the 22 ft length of the tote boxes made handling and transportation even more difficult.

The hat sections when cleaned were ready for the heat treatment which was the salt type (sodium nitrate). The sections were manually lowered into the molten (920 deg) salt by two men using long hooks and, after the dwell time, were extracted by the same men, using the same tools, and were quenched immediately.

Speed—One Big Ingredient

These men had to move fast. Process specifications call for the quench to be performed 9 seconds after the hats left the heat. The men had to be, and were, as agile as ballet dancers in transferring the hot, slithering sections from one tank to the cold quench. It was dangerous work and one burn was all they needed to prove it.

These sections warped a bit from the heat, were now ready for straightening but at this point the sections had to be moved to another location. Straightened, the parts were routed to the aging oven and eventually reached the marking location, all at various distances from each other, where the mixed-up tote boxes were sorted, orders collected and the stock binned.

The joker mentioned earlier was the specified length

of each hat section. If a 5 ft length was required, it was cut to 5 ft plus the pull waste. Yet if the cut had been to 20 ft (which would have made four sections 5 ft long) the handling throughout the long processing line would have been cut 75 per cent. It would have also been safer, more orderly, less expensive with far less chance of mixed lots.

Cutting After Processing

At the final station the parts could have been cut to finished size or could have been cut, as needed, when released from stock. Even the cutting after processing would save on the number of cuts and would save the wasted ends. The small to-size pieces required final cutting to size at each end because the ends of the sections were deformed from rolling and stretching. These end-cuttings were waste.

All of these practices added up to sufficient reason for streamlining this production operation but there was an even more urgent one. The newer airplanes were calling for hat sections whose maximum length could reach 30 ft. The existing equipment could not handle this length.

Major problem in a production line concept was the nitrate heat treatment installation. Previously, nitrate tanks were built of mild steel, with structural steel supports, and heavily insulated. These tanks were fired with 6-in. immersion tubes and atmospheric gas burners. The life of the tanks was variable. Some developed leaks in two weeks. Other tanks lasted up to a year without leaks but there was no uniformity. A new tank concept was imperative.

Considerable thought was given the quench operation that had to be accomplished in 9 seconds. If this was to be a production process then the placing of the sections into the sodium nitrate bath had to be mechanical; the removal had to be mechanical; the travel from the hot bath to the cold quench had to be automatic with a quick automatic dump into the cold water quench before the 9 second deadline.

Plant Engineering, after critical and inventive thinking, proposed a twin-tandem heat treatment-quench unit, Fig. 1, around which to build the entire processing picture. This was accepted by management.

A new sodium nitrate heat treatment building was erected in which all converting operations for hat sections could be done. And these hat sections would be in 30 ft sections.

The line began with a Yoder slitting machine so that rolled sheet stock could be economically bought and used. Yoder rolls were moved next in line and at the point where the freshly rolled hat sections emerged is the loading stand of the washing machine.

Chain conveyors move the hat sections into the washing machine where a soda wash, a rinse and a drying sequence removes all the grease picked up in the rolling operation thus eliminating degreasing. Delivered dry and ready for heat treatment, the sections are horizontally stacked and secured on a shelved fixture that accommodates thirty hat sections each 30 ft long.

As shown in the plan view, Fig. 2, the twin salt tanks are next and adjacent to them are their twin quenches. The new sodium nitrate tanks, 3 ft wide by 7 ft deep by 33 ft long are made of concrete and are set into the floor 30 in. below the surface. A 6 in. refractory insulation was used to line the concrete tanks. Next, a stainless steel inner liner is in direct contact with the molten salt. These tanks are fired in the same manner as the old systems—6 in. immersion tubes and atmospheric gas burners. They are exhausted by twin stacks that merge into a single stack before it reaches the roof. This installation, strangely enough, costs approximately 25 per cent of the original old style installations. And the average life of the tanks has gone up 400 per cent.

Twin quench tanks, in line with the salt tanks are 3 ft by 8 ft by 40 ft. These water tanks are equipped to recirculate the water so that its temperature will be highly stable even immediately following the quench moment.

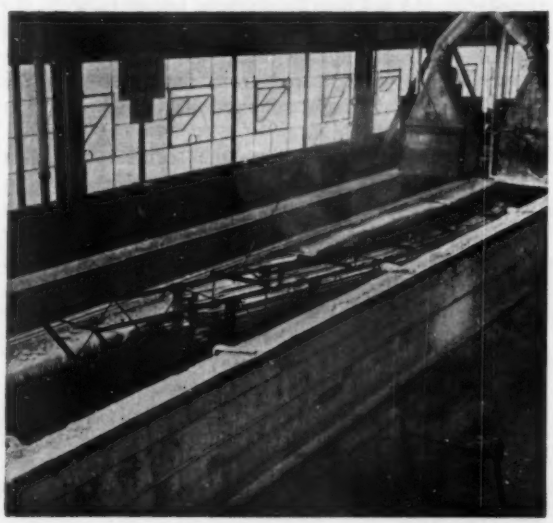
In operation, the cleaned hat sections are racked and then are lifted into the hot tank with an overhead crane. Before the removal time, a gantry fixture is rolled over the salt tank and is hooked to the holding fixture that contains the hat sections under treatment. At the proper moment of removal hydraulically-operated quadrants lift the racked sections from the salt bath and an air motor and cable system moves the rack longitudinally over the quench tank. At the proper position over the quench the quadrants lower the parts into the tank.

Average time between heat and quench is seven seconds but if there is a real rush the quench can be achieved in four seconds—hot bath to full quench.

Straightening stretch machine is adjacent to the quench and it is but a step from that machine to the loading cars of the aging oven. This oven ages in any cycle from 8 hr to 24 hr and with a minimum of handling.

After aging, the 30-ft hat sections are part numbered on a Douglas-designed and manufactured power marking machine whose capacity is 300 linear feet a minute,

Fig. 3. Lowering racked hat sections into hot solution.



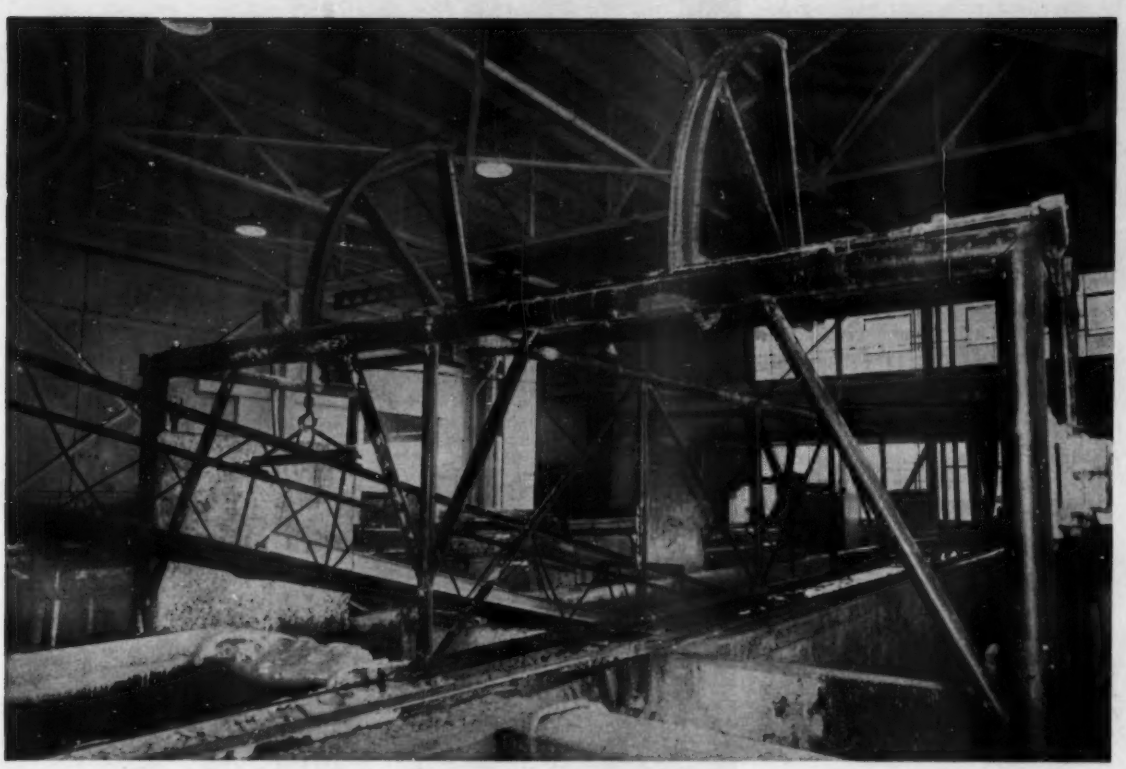


Fig. 4. Gantry, moving left to right, dunks forward end of rack carrying parts into cold water. Quadrants above frame in foreground still hold rack above edge of tank. Quadrants will swing down and lower this end of rack into water quench.

a bit faster than has ever been required to this time.

The marked sections are ready for part storage and are held there until required in fabrication when they are cut to length and delivered as needed.

Santa Monica Plant Engineering has full responsibility for the following:

1. Construction and design of buildings and systems.
2. Layout of equipment.
3. Design of component parts.
4. Contracting for purchaseable items.
5. In-plant fabrication of other items.
6. Installation of equipment.
7. Coordination of moves.
8. Providing handling equipment—cranes, dollies, baskets, etc.

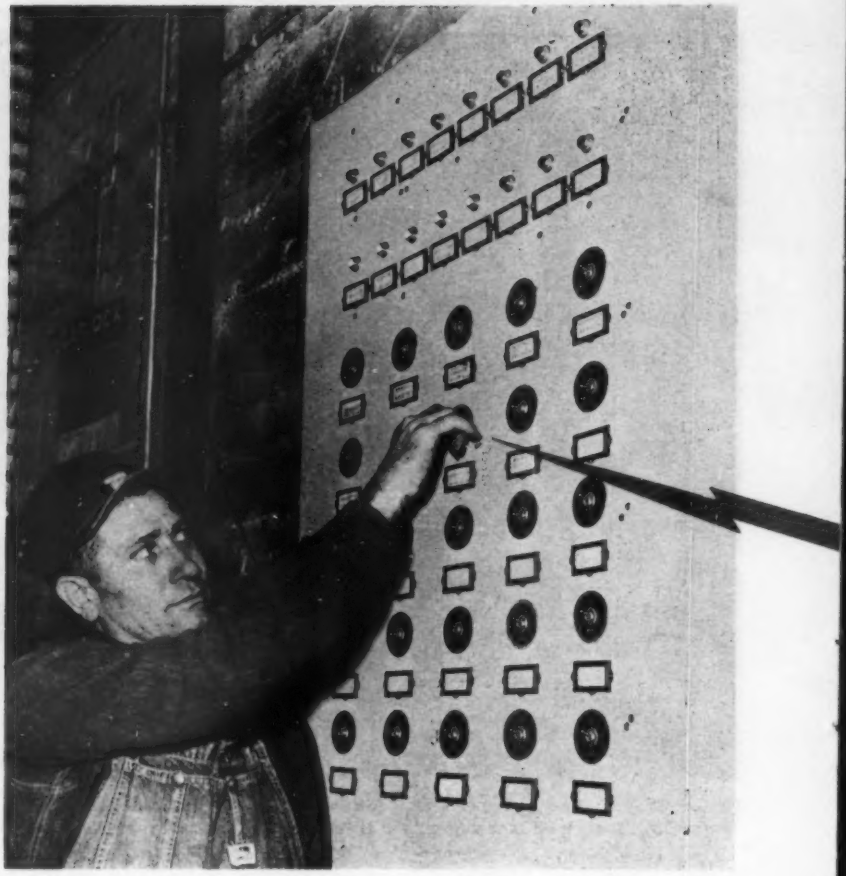
Inasmuch as a new building was constructed to house the heat treating installation construction went on simultaneously with the design and procurement of equipment. After preliminary layout had jelled, specifications were written for the washing machine and the aging oven. The Yoder rolls were on hand but the slitter had to be procured. Experience had pinpointed past troubles and solutions were not too difficult when we knew what to expect. For example: the concrete structures of the tank were poured at the same time as was the floor of the building.

Plant Engineering encountered very little trouble in breaking-in the system. The individual units were basically simple in design and resulted from elementary, workable ideas. The quench mechanism, which could have been a real source of trouble, operated beautifully from the start—the timing and travel lifting the load and lowering it from salt to quench without a hitch and without strain.

Installation of the aging oven did take longer than expected. We thought it would be delivered ready to jack into place and we timed our moves to that premise. It came, however, in knocked-down form and for a week things were a bit fouled up while it was assembled. In addition, we had planned on buying the dating and numbering machine but could find nothing on the market to handle the odd-shaped parts. So, Plant Engineering designed and built in the plan an infinitely variable machine that delivers, with low upkeep and easy maintenance, more capacity than we can use at the present time.

The washing machine, named the Screaming Demon, because of the whine of its pressure blower for heating its tanks, performed up to specifications and beyond.

Racking the hat sections for introduction to the salt heat treating solution was no small problem. When left loose and wired into the baskets (a normal way of handling heat treated parts) the sections twisted around each other in corkscrew fashion. When we tried introducing them when held securely the parts marred themselves. Racks were finally built with separators to contain the hats individually. This left room for them to turn and twist within limits. Now, twenty 30-ft long sections are processed and we achieve higher strength and uniformity than we did previously with hand quenching. **End**



Switches in boiler room allow operator to select day or night thermostat settings, override thermostats or close steam valves in distant buildings.

CUT HEATING COSTS WITH REMOTE CONTROL

Low voltage relay operated control system reduces heat in distant buildings during night hours

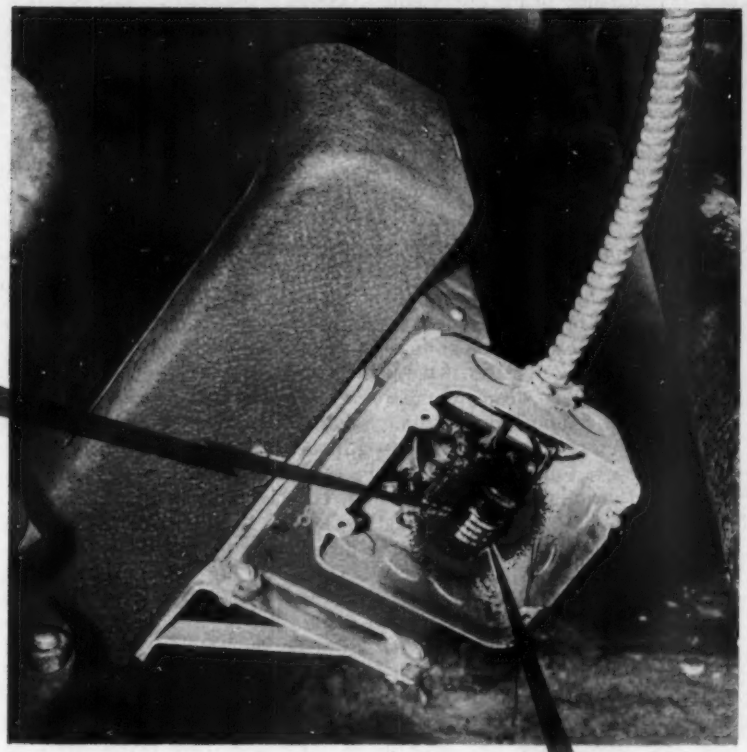
By H. MERLE PARSONS, Supt., Buildings and Grounds, Colorado State College, Greeley, Colo.

LIKE MOST COLLEGES throughout the country, Colorado State College has been forced to expand its instructional facilities during recent years to accommodate an increasing enrollment. This expansion has been accomplished by the erection of one large additional building and scheduling many classes and group activities in the evening.

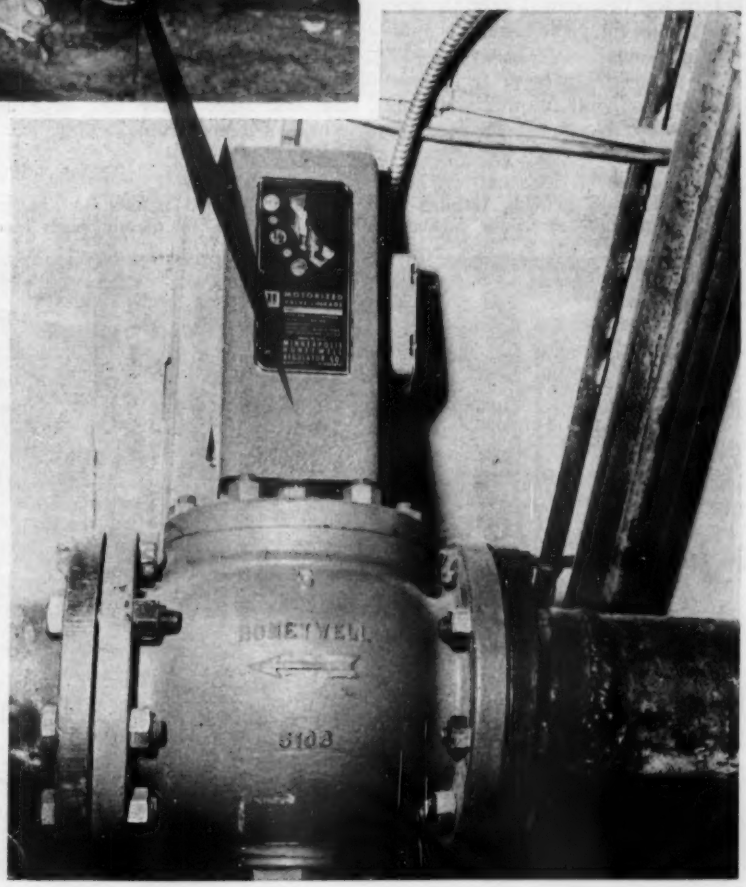
Steam heat is supplied to most of the buildings through buried steam and condensate return lines. Steam to the new building is supplied through a line which serves four other buildings. Since none of these buildings were equipped with master thermostatic control systems, it had always been the practice to reduce temperature during off-hour use by manual control. When evening functions were scheduled in any of these buildings heat was supplied to the entire group of buildings.

Although the older buildings on the steam line were being used more extensively in the evenings than in former years, their use did not approach the every night use schedule of the new building. To heat all of the buildings to provide heat for the new building had promise of being a very expensive operation.

Sensitive relay coil draws only 9.5 ma and permits control on No. 22 wires over distances up to 2500 ft. Contacts connected into motorized valve circuit.



Valve is placed in steam line entering the building and responds to thermostat signals or operator's commands.



Heat in the older buildings might not be required from 5:00 p.m. until 8:00 a.m. On the other hand, some evenings, heat might be needed until 9:30 or 11:00 p.m. With this variable need for heat, an automatically controlled master thermostat did not offer a proper solution to the heat control problem. Answer to the problem of supplying the variable heat needs in the several buildings seemed to be a master thermostat in each building which could be set for comfortable day temperature and off-hour temperature from the main boiler room.

Since there is no tunnel system or other connection through which lines could be run, the installation of a pneumatic control system was not possible. Motor operated valves could be used and controlled manually or thermostatically but could not be operated at considerable distances from the boiler room due to the voltage drop caused by heavy motor operating current.

Installation of a sensitive relay in the control circuit to interpret the commands sent from the boiler room and master thermostats solved the problem of operating motorized valves from a remote location. The system as finally evolved consists of a 24-v motor-operated valve installed in the steam line to each building; two thermostats, one set for "day" temperature and one set for "night" temperature; a sensitive 24-v relay; a 115-v to 24-v transformer and a four-position switch.

The four positions available on the switch permit the heating plant operator to operate a given building on "day" temperature or "night" temperature, to override the thermostats or to close the steam valves. The control panel, located in the boiler room, is a shallow metal box mounted in an angle iron frame. Hinges permit ready access to the back of the panel.

Wiring between the thermostats

and the relay is conventional thermostat wire. The wire between the transformer and the motorized valve is sized to take care of voltage drop. Wiring between the buildings and the boiler room is by means of No. 22 multiple conductor telephone cable. The number of conductors in the cable vary from 22 at the most remote building to 104 wires at the point where the cable enters the boiler room. Extra conductors were installed to provide spares for future expansion of the system and also to provide circuits for signal equipment.

As various sized cables are brought together from different directions on the campus, they are joined to larger cables in junction boxes. Since no complete tunnel or other connecting system was available, the cable is installed in walk-in tunnels, creep tunnels, class-bell conduits, a few runs of conduit installed for this purpose and finally in a section of plastic water pipe which was determined to be the best way to get the cable around a number of bends.

It is possible to operate the system up to 2500 ft on the No. 22 telephone cable due to the fact that the sensitive relay draws only 9.5 ma. The longest run installed to date is 2000 ft.

Valves were installed with regular maintenance steam fitters and the electrical work was done by maintenance electricians. No accurate record of costs were kept but such figures would not have too great significance on another plant because of the local conditions encountered in this installation.

Other Advantages

A purely incidental but very convenient feature of the complete control of steam to all buildings from the boiler room, is the fact that the operator can direct steam to those buildings that require a longer time to heat up before opening the steam valves to the rest of the buildings.

Irregular heating of buildings is handled through a daily heating schedule, prepared for the boiler room operators from building use requisitions filed with the Buildings and Grounds department.

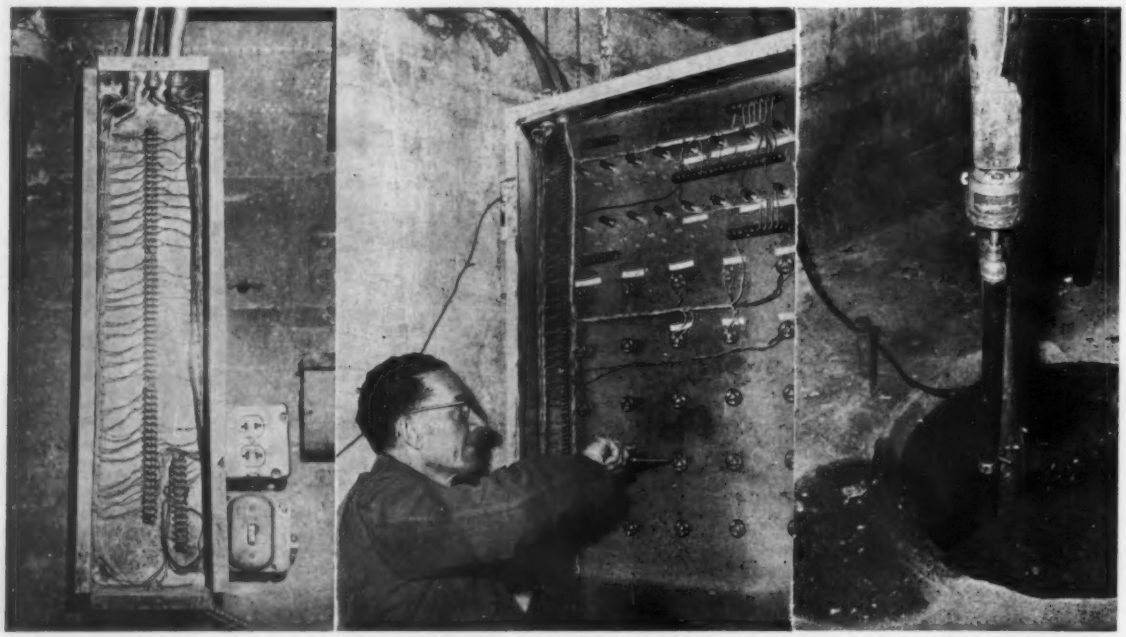
Condensate from the buildings is pumped back to the boilers by condensate pumps located in several buildings. While normally trouble-free, one large pump had been a source of considerable annoyance. In some cases the pumps are located in pits which drain into sumps kept clear with automatic sump pumps. Failure of sump pumps has flooded condensate pumps resulting in burned-out motors.

Advantage was taken of the new telephone cable to provide warning signal circuits between these condensate pump and sump pump locations and the boiler room. Now the operator is warned by signal light whenever a condensate pump fails to operate or when water in an automatically drained sump reaches a level higher than normal.

Key to the successful operation of both of these signal systems is an electric switch which operates on a slight air or vapor pressure differential. In the case of the condensate pumps, the overflow pipe from the pump is raised to provide sufficient head to activate the switch when the pump overflows.

In the sump system, the switch is mounted on top of a pipe suspended in the sump. If the level of the water in the sump raises to a certain height, the hydrostatic pressure on the column of air trapped in the pipe closes the switch. Signal lamps used take 150 ma but the voltage drop on a 2000-ft run is such that 14-v lamps must be used on the 24-v system. **End**

Junction boxes provide termination for multiple conductor cables. **Central control panel is mounted on angle iron frame hinged to permit ready access.** **Pressure differential switch signals operator when water in sump rises.**



time saver series

CONSTRUCTION COST ESTIMATING PART 4

BRICK AND CONCRETE BLOCK

In modern industrial construction, solid brick walls are being used less frequently. Almost universally used as a facing, brick is usually backed up with concrete block or hollow tile. This replacement of brick by block is due to lower labor cost in handling and setting blocks; one 8 x 8 x 16-in. concrete block will displace 12 common brick in a wall. However, for purposes of estimating, the costs of bricklaying apply to both solid and veneer brick walls.

Table I shows the quantities of brick, both common and face, in various thicknesses of wall.

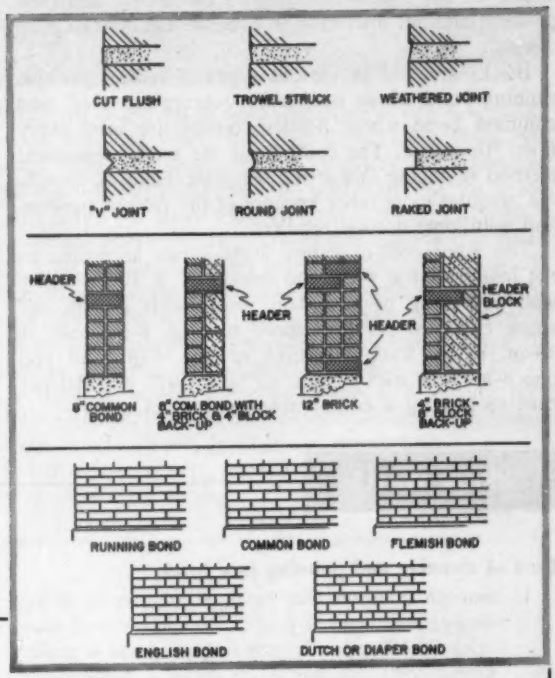
Brick laid in masonry cement, at $0.664/cu ft; 1 part masonry cement, 2½ parts sand.

Percentages to be added for various brick bonds:

Common full header course every 6th course, 16⅔%; every 7th course, 14⅓%.

Table II presents the actual costs of laying both types of brick. Here, as in previous tables, the cost is based on an "Engineering News Record" Building Cost Index of 525.

Common brick $48/1000; face brick $70/1000



BRICK WALLS

TABLE I

Type	No. Brick Thick	No. Brick Sq ft Wall	Brick per 100 Sq ft (2% Waste)	Sq ft per 1000 Brick	Labor per 1000 Brick		Labor per 100 Sq ft		Cu ft Mortar (10% Waste)	Cost per 1000 Brick	Cost per 100 Sq ft
					Mason	Helper	Mason	Helper			
4-in. Veneer	1	6.55	668	152.67	9.3	9.0	6.09	5.90	9.6	$6.37	$ 4.18
8-in. Wall	2	13.10	1336	76.33	9.3	9.0	12.18	11.80	13.0	8.03	11.31
12-in. Wall	3	19.65	2004	50.89	8.0	8.0	15.72	15.72	14.2	9.43	18.52
16-in. Wall	4	26.20	2672	38.17	7.0	8.0	18.34	20.96	14.7	9.76	25.57
B—Running bond			4% Waste								
4-in. Face	1	6.55	681	152.67	18	12	11.79	7.86	9.6	6.37	4.18
C—Common bond, header every 6th course											
4-in. Face	1	7.64	794	130.89	18	12	13.75	9.17	13.0	8.03	11.31
4-in. Common	1	5.46	557	179.53	9.3	9	5.08	4.91			

TABLE II

Item	Common Brick Wall				4-in. Face Running Bond	4-in. Face 4-in. Common
	4-in.	8-in.	12-in.	16-in.		
No. of Brick (Table I)	668	1336	2004	2672	681	794/557
Cost of Brick	32.06	64.12	96.18	128.24	47.67	55.58/26.74
Cost of Mortar (Table I)	4.18	11.31	18.52	25.57	4.18	11.31
Labor Cost	40.01	80.03	104.78	130.66	69.36	78.43/32.34
Overhead: 10% Material	3.62	7.54	11.47	15.38	5.19	9.36
Overhead: 20% Labor	8.00	16.00	20.96	26.13	13.87	22.15
Insurance, etc.: 16% Labor	7.68	15.36	20.12	25.09	13.32	21.27
Total Labor and Material	95.55	194.36	272.03	351.07	153.59	257.28
Profit, 10%	9.56	19.44	27.20	35.11	15.36	25.73
Total Cost per 100 sq ft of wall	105.11	213.80	299.23	386.18	168.95	283.01

The style of mortar joint has considerable bearing on the labor costs. The flush cut is the most economical because the brickmason cuts off the excess mortar with his trowel and the joint is finished. For the other types of joints, as shown in the sketch, it is necessary to cut off the excess mortar with the trowel and then perform another operation to produce the type of joint desired.

Bricks are laid in various types of bonds, such as running bond where no header courses are used, and common bond where header courses are used every 6 or 7th course. The common is the most economical method of laying face brick. English, Flemish, Dutch, etc., require more labor because of the various patterns and additional cutting required.

The labor cost of cavity walls varies according to the length of the walls and thickness. A 10-in. cavity wall consisting of two 4-in. walls with a 2-in. air space costs 20 per cent more than an 8-in. wall. A 14-in. cavity wall, consisting of one 4-in. wall and one 8-in. wall with a 2-in. air space will cost 10 per cent more than a comparable solid 12-in wall.

BRICK WALLS

Cost of cleaning and pointing face brick.

1. Smooth textured face brick $0.08 per sq ft including overhead & profit. Rough textured face brick $0.10 per sq ft including overhead & profit. These costs are based on using a brickmason and helper.
2. Cost of cutting out joints, using tuckpointer and helper, $0.122 per ft including overhead & profit.
3. Cost of repointing mortar joints after having been cut out, using tuckpointer and helper, $0.205 per ft including overhead & profit.

Calculation of the cost of 100 sq ft of 8-in. wall of common brick:

1310 bricks per 100 sq ft + 2% breakage 1336 bricks, at $48.00 per 1000	$64.12	
Mortar for 100 sq ft 13 cu ft per 1000 bricks, including 10% waste 17.03 cu ft for 1310 bricks at $.664 per cu ft	11.31	
Total material cost	$75.43	
Overhead, 10% material cost	7.54	
Total material cost, including overhead		$ 82.97
Labor: Mason, 12.18 hr at $3.79	$46.16	
Labor: Helper 11.80 hr at $2.87	33.87	
Total labor cost	$80.03	
Overhead, 20% labor cost	16.00	
Total labor cost including overhead	$96.03	
Insurance, etc., 16%	15.36	
Total labor		$111.39
Total labor and material		$194.36
Profit, 10%		19.44
Total cost for 100 sq ft of 8-in. common brick wall		$213.80

CONCRETE BLOCK WALLS

The use of concrete block for exterior and interior bearing walls, as well as backing up for face, press or common brick has increased greatly.

Specifications for concrete block should state that the block was manufactured in accordance with the standards set up by the American Society for Testing Materials.

Concrete blocks are manufactured in two weights. The lightweight block uses an aggregate of burned clay, cinder, processed slag, pumice, perlite or vermiculite. The heavyweight block uses an aggregate of sand, pebbles, crushed stone or slag.

These two types of blocks may be used interchangeably for all purposes. The lightweight units afford a saving of weight to secure economy in design, increased heat and sound insulation and a better nailing base.

Calculation of the cost of 100 sq ft of 8-in. wall of lightweight concrete block:

112.5 block per 100 sq ft + 4% for breakage 117 blocks, at $0.23 each	$26.91	
Mortar for 100 sq ft 6 cu ft at $0.50	3.00	
Total material cost	$29.91	
Overhead, 10% material cost	2.99	
Total material cost, including overhead		$ 32.90
Labor: Mason, 5.63 hr at $3.79	21.34	
Labor: Helper, 5.63 hr at $2.87	16.16	
Total labor cost	37.50	
Overhead, 20% labor cost	7.50	
Total labor cost including overhead	45.00	
Insurance, etc., 16%	7.20	
Total labor		$ 52.20
Total labor and material		85.10
Profit, 10%		8.51
Total cost for 100 sq ft of 8-in. concrete block wall		$ 93.61

Table III gives the dimensions and weights of various sizes and types of block as well as the hours of labor and mortar required to lay 100 sq ft of block. The actual quantities of mortar figure out about half those given in the table because considerable mortar is lost in droppings and waste.

Table IV covers the actual cost of laying concrete block. This table can be corrected to take care of variations in prices of labor or material.

Blocks laid, running bond, horizontal joints tooled, vertical joints struck flush, joints ⅜-in. cement lime mortar.

Mason rate $3.65 + 0.07 + 0.07 = $3.79 per hr. This includes welfare & vacation.

Helper rate $2.73 + 0.07 + 0.07 = $2.87 per hr. This includes welfare & vacation.

Cement lime mortar 1:1:6; $0.50 cu ft

Cement mortar $0.61 per cu ft If cement mortar is used, increase labor cost 5%.

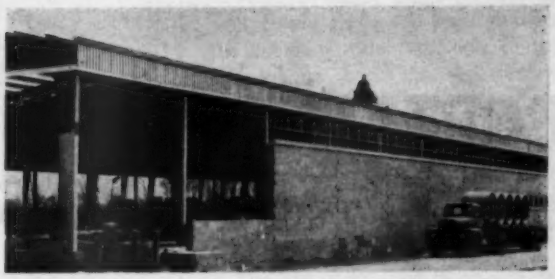
117 block used per 100 sq ft; this allows for 4% breakage.

Control joints: $0.28 per lin. ft for material, $0.55 per lin. ft for labor total $0.83 per lin. ft

Keywall cost applied per lin. ft: 4-in. wall $0.045, 6-in. & 8-in. wall $0.05, 10-in. & 12-in. wall $0.055.

Silicone waterproofing applied; $0.06 per sq ft

Asphalt dampproofing applied; $0.06 per sq ft



Cavity walls: 10-in. wall consisting of two 4-in. walls with 2-in. air space will cost 15% more than two 4-in. walls built separately; 12-in. cavity wall consisting of one 4-in. wall and one 6-in. wall with 2-in. air space will cost 15% more than separate 4 and 6-in. walls.

When measuring the plans and listing the quantities of block required, always take exact measurements for length and height and deduct all openings in full. Do not count the corners twice but have your estimate show as accurately as possible the actual number of blocks required to complete the job.

Table V covers the cost of lap lock coping tile. The price of the mortar was not considered because there is enough left from the masonry work.

Labor on corners, ends and starters is three times that of straight coping.

TABLE III

Wall (In.)	Size of Block	Hr. per 100 Block		Hr. per 100 Sq ft		Blocks In 100 Sq ft	Cu ft Mortar 100 Sq ft	Weight In Lb	
		Mason	Helper	Mason	Helper			Light	Heavy
4	3⅝x7⅝x15⅝	4.0	4.0	4.5	4.5	112.5	5	16-18	23-25
6	5⅝x7⅝x15⅝	4.5	4.5	5.06	5.06	112.5	5	24-26	35-37
8	7⅝x7⅝x15⅝	5.0	5.0	5.63	5.63	112.5	6	29-31	45-47
10	9⅝x7⅝x15⅝	5.7	5.7	6.41	6.41	112.5	6.5	36-38	57-60
12	11⅝x7⅝x15⅝	6.7	6.7	7.54	7.54	112.5	7	40-42	64-67

Heavyweight block labor, 10% more than lightweight block.

TABLE IV

Costs	Heavyweight					Lightweight				
	4	6	8	10	12	4	6	8	10	12
Blocks (117)	18.72	22.23	24.57	30.42	32.76	18.72	23.40	26.91	32.76	35.10
Mortar	2.50	2.50	3.00	3.25	3.50	2.50	2.50	3.00	3.25	3.50
Labor	32.98	37.07	41.21	46.96	55.24	29.98	33.70	37.50	42.69	50.22
Overhead: 10% Material	2.12	2.47	2.76	3.37	3.63	2.12	2.59	2.99	3.60	3.86
Overhead: 20% Labor	6.60	7.41	8.24	9.39	11.05	6.00	6.74	7.50	8.54	10.04
Insurance, etc.: 16% Labor	6.33	7.11	7.91	9.01	10.58	5.76	6.47	7.21	8.19	9.64
Total Mat'l. and Labor	69.25	78.79	87.69	102.40	116.76	65.08	75.40	85.11	99.03	112.36
10% Profit	6.93	7.88	8.77	10.24	11.68	6.51	7.54	8.51	9.90	11.24
Total Cost/100 sq ft wall	76.18	86.67	96.46	112.64	128.44	71.59	82.94	93.62	108.93	123.60

Block cost includes 4% for breakage.

TABLE V

Width (In.)	Cost per ft	Hours per 100 ft		Labor Cost	Overhead 20% Labor	Ins. 16%	Overhead 10% Mat'l.	Profit 10%	Total Cost per 100 ft	Cost per ft
		Mason	Helper							
9	0.56	5.2	5.2	34.63	6.93	6.65	5.60	10.78	118.59	1.19
13	0.84	6.5	6.5	43.30	8.66	8.31	8.40	15.27	167.94	1.68
18	1.70	7.3	7.3	48.66	9.73	9.39	17.00	25.68	282.46	2.82

Mason rate $3.79 per hr; helper rate $2.87 per hr

PORTABLE COMMUNICATION SYSTEM FOR NOISY AREAS

It can be used as a maintenance training tool as well as to describe operations to plant visitors

By H. S. HALL, Senior Engineer, Western Electric Co., Inc., Point Breeze Works, Baltimore, Md.

ON-THE-SPOT description of machinery operations can be a real boon in training maintenance personnel. This can now be accomplished despite the ambient noise level. The answer is in the portable communication system developed at the Point Breeze Works of Western Electric Co., Inc. At the present time the equipment is being used at this plant to describe the various operations in noisy areas to plant visitors.

The equipment used had to be economical as well as easily and readily movable from one location to another. The system described was designed to accommodate up to 10 persons per group, as it was felt that for the planned application a larger number of persons could not conveniently observe operations at any one location.

Equipment consists of a junction box, containing all circuit components and an attached microphone, which is positioned on the speaker's chest. Each person is furnished a lightweight stethoscope style headset, equipped with an individual volume control, which is plugged into the junction box. Long cords on the headsets permit the men to move about within a 10-ft radius of the instructor or guide.

The headset is a commercially available unit, but has been modified by the addition of a wire spring at the pivot point of the sound arms so as to provide tension in a direction tending to keep the sound arms pulled together. This was found to be a convenient means of properly adjusting the headset to the ears by persons unfamiliar with this type equipment.

Fig. 1. Illustration shows the portable communication equipment in use. Trainees or plant visitors merely plug their headset into the junction box to hear speaker.

For sanitary reasons, a procedure was set up whereby the ear tips of each headset are replaced with new or sterilized ones before the headset is reassigned to another person.

The circuit is shown in Fig. 2. It is essentially that of a basic local battery telephone connected for one-way operation. Two flashlight cells and a carbon microphone, all in series, are connected to the primary of an audio transformer. Up to 10 magnetic headsets are connected in parallel across the secondary of the transformer through miniature plugs and jacks.

A potentiometer type volume control, built into the cord, controls volume at each headset individually. Thus, the alternating component of the voice current from the microphone is transmitted through the transformer and applied to the headsets. The signal voltage is amplified somewhat by the approximately 3:1 step-up ratio of the transformer. Since the type of headset used requires very little power,

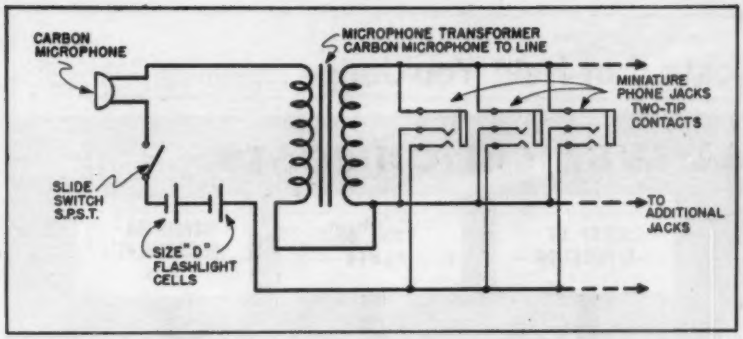


Fig. 2. Wiring diagram shows various components of communication system.

no power amplification of the signal is required.

Primary and secondary windings of the transformer are made common at one end, simply to facilitate a switching arrangement at the headset jacks to open the battery circuit automatically when no headsets are plugged in. Otherwise, there is no need for a common connection between the two windings. The jacks are equipped with two tip contacts.

When a headset plug is inserted in any one of the jacks, the headset is connected across the transformer secondary via the sleeve and one tip contact. Also, the tip of the plug short circuits the two tip contacts on the jack, thus completing the primary battery circuit.

The tip contacts are so arranged that connection to the one wired to the transformer secondary is made before the two are shorted by the plug tip, thus eliminating the need for a blocking capacitor to prevent the momentary flow of direct current through the headset when the plug is inserted. When no plugs are in the jacks, the battery circuit is open and no power can be drawn from the battery.

A slide type switch provides a means of turning off the power with the headsets connected. Miniature plugs and jacks are used for headset connection to minimize the jack space required on the junction box. Total battery current drain will be in the range of 50 to 150 milliamperes.

Features which make this system well suited to noisy locations are the speaking tube attached to the microphone and the stethoscope style headsets. The speaking tube is effective in preventing a considerable amount of unwanted ambient noise from reaching the microphone. On the headset, the eartips fit snugly into the ear and block out external noise.

The speaking tube need not be located closer than two to three inches from the mouth. This permits considerable angular movement of the head while talking but still allows the speaker to talk at a normal voice level regardless of background noise. Speaking loudly or straining one's voice is not necessary.

This is a one-way system and no provision is made for a person to reverse direction of communication to ask questions. This need is easily overcome, however, since it is not difficult for one person to ask a question directly to the instructor or guide without a microphone. The instructor may then repeat the question into the microphone for all concerned to hear.

Although there are limitations to this system, notably the need for connecting cords and the limited number of persons that can be accommodated, it has proven to be quite satisfactory. **End**

WASTE OIL IS NOT WASTED AT TIMKEN

MANY COMPANIES are faced with the problem of disposing of wastes without contaminating streams and water supplies. The Timken Roller Bearing Company of Canton, Ohio, has neatly solved the problem of disposing of waste oil by using it as fuel in a rotary, preheating furnace. The savings in fuel pays for the operation involved in collecting and reclaiming the oil before it is burned.

Waste oil is collected in several centrally located 20,000 gallon tanks. Soluble oil and water solutions and lubricants of all kinds are dumped in the tank together. No attempt is made at this point to screen or remove dirt or break the emulsion. Most of the waste comes from soluble oil washers, oil and dirt stills, and kerosene which is used for cleaning.

In more isolated places, 50 gallon drums painted green and plainly marked "waste oil" are used as receptacles and emptied into the sump when full.

Tank trucks with a capacity of 5000 gallons haul the "slop" oil to the company's reclaiming plant located adjacent to its acid neutralizing facilities. This serves a special purpose. The waste oil is dumped into a 20,000 gallon sump. Waste acid from the acid neutralizing operation is added to the solution where it is heated and agitated. This breaks down the emulsion causing the oil to rise to the top.

Skimmers, made of plain pipe cut in half lengthwise and supported by a stainless steel float, move with the liquid level to drain the oil to a second tank. In this tank the oil is given a water wash to remove any remaining acid. It is then pumped to a third 5000 gallon tank where it is again heated and allowed to settle to separate what little water remains. The reclaimed oil is pumped to a 30,000 gallon storage tank. When tank is full, oil is used in rotary furnace.

Furnaces at the plant are equipped with combination oil and gas burners that permit the two types of fuel to be burned. On the rotary furnace that preheats billets prior to their being pierced, two of the heating zones use the oil as fuel. **End**

Gremlin Lubrication Costs Can Help You Judge . . .

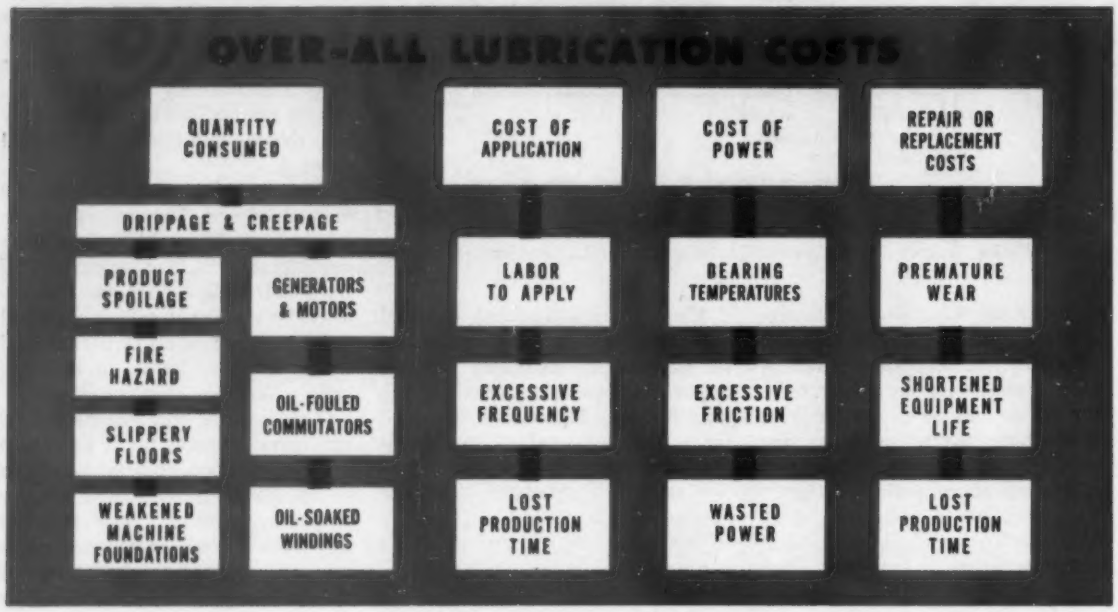


Fig. 1 Chart points—not just weight times price per pound—to be considered for analysis of lubricant value.

. . . the merits of

STANDARDIZATION in a LUBRICATION PROGRAM

By R. C. GARRETSON, Lubrication Engineer, Westinghouse Electric Corp., East Pittsburgh, Pa.

A SOUND LUBRICATION program is based on: standardization of products used; pinpointing of responsibility; and establishment of uniform procedures. In fact, the essence of a good program can be stated as the four R's of lubrication: right lubricant, right place, right time, right quantity. But to put these four R's into practice is not simple.

Until two years ago, each of the Westinghouse major departments in East Pittsburgh, Pa., was responsible for its own maintenance and no two systems were alike. Some departments delegated work to an oiling crew. Another permitted the men to shut down their machines for this purpose, and paid them on an extra work slip. Others included allowances in the time studies for cleaning and oiling. The latter two systems were greatly abused. Scheduled work, such as changing oil or cleaning filters, was also neglected.

Because of this situation, a lubrication committee was formed early in 1957.

The committee attributed excessively high lubrication costs to:

1. Overloading of equipment.
2. Use of improper lubricants.
3. Neglect due to split responsibility.
4. Confusion as a result of multiple responsibilty for decisions.
5. Lack of scheduling and follow-up of relubrication.
6. Lack of scheduling of drain periods.
7. Use of too much or too little lubrication.
8. Contaminated lubricants.
9. Painting over of lube fittings, sight gages, etc.

The first thing done to overcome these difficulties and put an active lubrication program into effect was to prepare lubrication charts for each of 12,000 items of equipment. Prepared by the lubrication engineer, these charts are based on his analysis of the following conditions:

1. Machine design.
2. Normal or abnormal operating conditions.
3. Condition of equipment.

MACHINE	TYPE	MODEL NO.	SIZE	LUB. CARD NO.
Welder, Semi-Auto.	Boom Type	Movable Carriage		864-A
MFR. Bentley Welding, Inc.		USER DIV. AWP		CARD 1 OF 1

PART	LUBRICANT	APPLICATION	AMOUNT	POINTS	FREQ. OF SERVICE	CODE*
(A) Gear cases inside column base	2727-1		Keep filled	2	Chk 3 mos. Chge yrly (B)	3 5
Boom drive gear case on rear of boom carriage	2727-1		Keep filled	1	Chk 3 mos. Chge yrly	3 5
Wire feed gear case in Weldomatic Head	2727-1		½ full	1	Chk 3 mos. Chge 6 mos.	3 4
Gears inside base	12130-300				3 months	3
PGF on inside, and beneath column base (B)	12279-280		2 or 3 shots		Monthly	2
PGF on boom & carriage wheels	12279-280			10	Monthly	2
Clean & repack idler roller (C)	12279-280			1	3 months	3
Grease cups on wire reels	12279-280		Keep filled	1 each	Turn weekly Fill monthly	1 2
Hand oil boom feed rack & pinion, head adj. worm drives	12130-300		Keep oiled		Each shift	

SPEC. INSTS. (A) Base traverse unit inside LH cover and column swivel lock unit inside RH cover (B) For wheels, guide rollers, column swivel, etc. (C) On Weldomatic Head.

BY	DATE	CHECKED BY	DATE	DATE OF LATEST REVISION
Robert C. Barnetson	10/11/58			November 10, 1958

MACHINE LUBRICATION SPECIFICATION - (W) FORM 28778C * CODE: 1 = WEEKLY 2 = MONTHLY 3 = 3 MOS. 4 = 6 MOS. 5 = YEARLY

Fig. 2 Lubrication chart gives identification number, machine description, special instructions and index of lube charts.

4. The lubrication system now in use.

5. The recommendations of the machine builder.

6. Lubricants available in the plant.

7. Probable number of hours of operation.

Figure 2 shows a typical lube chart, the design of which has been standardized for use throughout the corporation. The number in the upper right hand corner is for proper identification and to simplify scheduling and record keeping. The heading gives a complete description of the machine, including name of manufacturer, and an index of all lube charts is maintained by manufacturers name, to simplify the application of these instructions to other identical machines.

The four R's are satisfied by stating where to apply the lubricant, what lubricant to use, how much should be applied, and how often the machine is to be serviced. Note that in this example, the machine must be serviced daily, weekly, monthly, quarterly, semi-annually, and annually.

In addition to standardizing on the method of presenting lubrication instructions, it was agreed to follow the preferred method of using only those lubricants which have been approved by the Materials Engineering department. Large volume items are purchased against written specifications. In addition to the Purchasing department specification numbers, materials numbers are assigned to brand name products.

Number Identification

As in the case of the lube charts, the numbers serve a useful purpose for reference, identification, and in machine record systems. In some cases, a particular number may be assigned to only one brand but, whenever possible, it is preferred to list at least two or three equivalent products against the same number. This permits some competition in the purchasing of the material.

IBM punched cards are used for the purpose of scheduling all work occurring at intervals of one week or longer. It was decided to standardize on a 48-week year, and to assign an arbitrary number or code to each frequency. Thus, weekly became code 1; monthly, code 2; quarterly, code 3; semi-annually, code 4, and annually, code 5.

Figures 3 and 4 show a master IBM card which is prepared from information supplied to the tabulating room, and a detail card (work order) which is sent to the lubrication foreman to notify him that certain lubrication tasks are due. The work order is then passed on to each oiler.

Each oiler stops at each machine for which he has a work order, checks the frequency codes scheduled, then pulls the proper lubrication chart from his file. He studies it to determine what parts are to be lubricated, and what lubricant and how much to apply. When he completes all the work, he initials the card, and at the end of the shift turns in all completed cards to his foreman.

Once a week all completed cards are returned to the tabulating room, where they are matched with the master cards. The latter are then punched in the proper columns and spaces to show that the job has been done.

The scheduling of daily lubrica-

tion by means of IBM cards would be burdensome and would serve no useful purpose, since it is routine. However, an oiler must know which of the many machines are to be serviced daily, and which are to be scheduled. He is, therefore, provided with a listing of all machines for which he is responsible, with an (X) placed beside each machine which must be serviced every day.

The machines in this list are arranged in a preplanned sequence. This makes it relatively easy to locate any oiler since the foreman knows where each oiler should be at a particular time of the day. The preplanned routes reduce travel time to a minimum.

One authority recently estimated that 25 percent of an average oiler's time is spent making return trips to an oil crib. It is probable that total walking or travel time amounts to more than this in many shops.

In many plants, it is not uncommon to see an oiler walking his route with an oil can in one hand and a grease gun in the other. To make it possible for an oiler to carry with him the large variety of lubricants and lubricating equipmenit, a truck was built to carry enough of each lubricant for at least a four-hour period. The truck is painted yellow, so that it can be spotted from a distance. This helps the lubrication foreman to locate and check his men.

Centralized Lube System

By standardizing on a scheduling program, there is a reduced possibility of machines being overlooked and neglected. However, it is still possible that parts of machines might be overlooked. This is true even though written instructions are provided.

A manually operated centralized lubrication system is one possible solution to this and several other problems. The system consists of a central pumping station from which the lubricant is forced through main lines to metering valves. These valves, which are available in different sizes and which in some cases are adjustable, deliver measured quantities of lubricant through discharge lines to the bearings.

Centralized lubrication system makes it possible to deliver the right lubricant to the right place, in the right quantity. The only variable then is the right time, which in the case shown depends upon proper scheduling. Automatic systems are available which periodically feed small amounts of lubricant only when the equipment is operating. Such systems improve the safety of personnel, prevent the downtime often necessary for servicing, improve housekeeping, extend machinery life, and reduce operating costs.

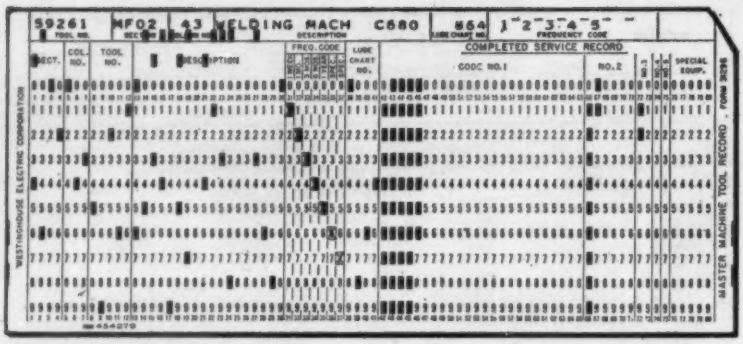


Fig. 3. Master IBM card is prepared from information supplied to tabulating room.

Another possible solution to this problem is to install a coded lubrication system. There are many types available, each of which makes it possible for inexperienced, untrained personnel to do an adequate job of lubrication, since it is necessary only to match a symbol (or color) on a drum with the symbol (or color) on the transfer equipment and then with the symbol (or color) at the bearing, to assure getting the right lubricant to the right place.[1]

Unfortunately, many fittings are located behind guards, under covers, and in other inaccessible locations. In those cases where centralized lubrication systems would be impractical, extension fittings can be used so that the equipment can be lubricated without being shut down. In order to reduce the amount of climbing required, tubing can be used to connect isolated bearings to a common header block, on which the fittings are located.

This can definitely be a help, but it creates a new problem. Thus, the oiler does not know what lubricant to use and how much to apply. Oilers have been known to give 15 to 20 strokes of a grease gun to such blind fittings, where one stroke was probably sufficient. The use of centralized equipment, would, of course, be an ideal solution, but in many cases the cost cannot be justified.

The next possible solution to this problem is based upon the standardization of grease fittings. This will not solve the right quantity problem, but it does help to solve the problems of getting the right lubricant to the right place.

Standardize on Fittings

For certain applications, fittings can be standardized. The standard hydraulic fitting is the cheapest and most commonly used in industry today. However, the pin-type fitting is very commonly used in Westinghouse. Most oilers have adapters so that a grease gun, which is equipped with an hydraulic coupler, can be used on a pin-type fitting. Therefore, these two fittings will be standardized for all general purpose grease applications where over-lubrication is not a problem.

In the case of grease-lubricated motor bearings and other high-speed bearings, where over-lubrication rather than under-lubrication is more of a problem, Westinghouse intends to standardize on the standard button head fitting.

In a few cases, special greases are required. For example, a few high temperature oven bearings require a special high temperature grease. Also, a very few bearings require a graphite grease, in which an electric current must pass, without arcing, from the bearing to the journal.

1. See "Coded Lubrication System" PLANT ENGINEERING, page 126, Vol. 12, No. 9, 1958.

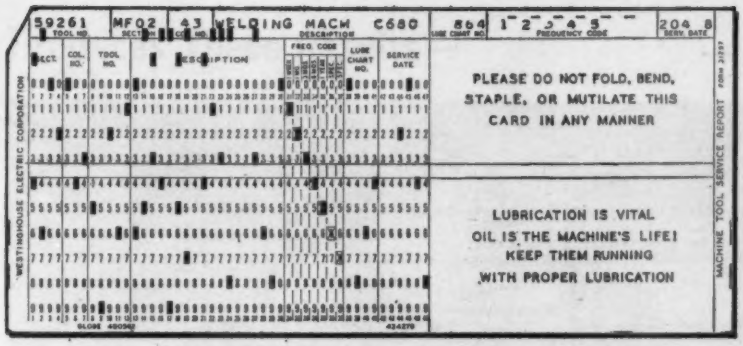


Fig. 4. Detailed card is actually a work order given to the lubrication foreman.

For these applications, the intention is to standardize on a dot fitting, which requires a special gun. Standard grease guns cannot be adapted for use with these fittings, nor can the special dot guns be filled with the loader pumps which are provided. These safeguards can reduce the dangers of misapplication.

The giant button head fitting will be used as a quick coupling for filling pump reservoirs, and the flush type fittings will be restricted to those very few applications where the fitting is mounted on a moving part in such a way that other fittings would create a hazard or would interfere with the operation of the machine.

The proper education and training of personnel helps to improve any lubrication program. Once a month a class is held during which the fundamentals of lubrication are taught; the proper handling, storing, and dispensing of lubricants; the correct methods of application of lubricants and of reservoir maintenance; the care and maintenance of antifriction bearings; etc.

Booklet of Instructions

As specific lubrication problems arise, such as the failure of certain motors due to over-lubrication (both quantity- and frequency-wise) the probable causes and possible solutions to those problems are discussed. Eventually, a pocket size booklet of instructions will be published for the personnel.

One requirement which is now under serious consideration is that no machine shall be designed in such a way that daily servicing is required. Think what this will save in terms of cost of application!

Following are some typical standardized requirements:

1. Lubrication devices must not be mounted on moving elements.
2. All lubrication equipment must be so located that it will not be used as a ladder, and will not interfere with adjustments to or maintenance of the equipment.
3. All tapped holes must be to NPT standards.
4. Sealed, prelubricated bearings must be used wherever possible.
5. Pipe plugs, rather than fittings, should be used if the lubricant is expected to last three years or longer.
6. If over-lubrication can cause damage, pressure relief vents or overflow chambers must be provided.
7. All hydraulic, pneumatic, and electric components must conform to the latest JIC standards.
8. Not more than one bearing is to be served from one fitting, unless provision is made for the proper distribution of the lubricant.
9. Lubricating, hydraulic, and process lubricant systems must be separated so as to prevent possible mixing.
10. Lubrication diagrams, charts, etc., must be delivered to the purchaser one week before the machine is shipped and must conform with the equipment as shipped.
11. Lubrication charts must show, among other things:
    a. Name, size, and catalog number of filter
    b. Specifications of recommended lubricants
    c. Frequency of service based upon hours used
    d. Proper adjustment of lubrication devices
12. All points must be accessible without using ladders or removing guards, panels, covers, etc.
13. If fittings must be on moving parts, they must be located where a swivel connection can be used.
14. No grease fittings are to be used if oil is the preferred lubricant.
15. Airline lubricators must be mounted where they can be seen and serviced, and must have transparent bowls.
16. Centralized lubrication systems, with suitable interlocking safety devices, must be used if possible.
17. All fill points must be identified.
18. All reservoirs must be provided with drains and the reservoirs so mounted that a catch basin can be placed beneath the drain.
19. Level gages must be located so that they can be seen while filling reservoirs.
20. All standards must be adhered to unless the proposed deviation is approved in writing and made a part of the purchase contract.

Savings Possible

From the above, it is evident that most lubrication problems can be eliminated by forethought.

The institution of a sound lubrication program, based to a great extent upon standardization, can result in cost reductions similar to the following:

1. 15 per cent savings in parts replacement costs as a result of reduced wear.
2. 10 per cent savings in machine repair labor costs.
3. 25 per cent savings in lubricant and coolant costs.
4. 75 per cent savings in the cost of issuing purchase requisitions and orders.
5. 40 per cent savings in labor cost in the handling of drums.
6. Reduced power costs.
7. Reduced downtime.
8. Lubricant inventories reduced, with better records.
9. Increase in available floor space because of decreased inventory of lubricants, and because of engineered storage. **End**

This Kind of Research —

Lloyd Owen, left, and author R. H. Horner in room used to check high frequency equipment.

HIGH FREQUENCY LIGHTING —

Two years experience indicates useful lamp life increased by one-third

By R. H. HORNER, Electrical Engineer, The Wakefield Company, Vermilion, Ohio

EARLY IN 1956, a high frequency lighting system was installed in our new office building to provide an in-service laboratory for study of this system in daily use. Power is supplied at 840 cycles and 400 volts to a standard multi-purpose translucent ceiling of our own design. Covering an area of 5000 sq ft, the lighting system also provides control of office noise, distribution of conditioned air, provisions for a sprinkler system and flexibility in office layout.

Theoretically, high frequency has many advantages and one of these is savings that start with the original installation. Because it was expected that T-12, warm white, Slimline lamps would be more efficient operating on high frequency, two lamps were mounted to provide an illumination level of 80 ft-c where three would have been used in a conventional 60-cycle system. At 60 cycles, a total of 795 lamps would have been required to generate the required lumens. At 840 cycles we actually installed only 596 lamps.

Additional installation savings are made on the ballast equipment required for 840-cycle operation. Capacitor type ballasts and power factor correction inductor coils cost a small fraction of the amount required for 60-cycle ballasts. At 840 cycles, ballast equipment weighs about 400 lb compared to almost a ton of ballasts required for 60-cycle operation.

High frequency for general use in lighting has been under experimentation since the advent of the fluorescent lamp. Before this time, it was used only in specialized applications such as on trains, planes and busses generating their own

Produces These Results —

Operating on 840 cycles, this office lighting installation accumulated 10,125 burning hours with only four lamp failures.

power. Until 1956, there had been only two applications that converted local power to high frequency.

With no precedent for lighting offices by high frequency, an early consideration was—which frequency? It was known that the efficiency of fluorescent lamps increased up to about the 10,000-cycle range, then flattened out. Transmission losses, at current values up to about 30 amp, were found to be negligible up to 1000 cycles. On the voltage side, higher voltage would bring savings in copper and reduced line losses. The highest allowed by the National Electrical Code would be 600 volts, center-tapped, to provide a maximum voltage to ground of 300 volts.

From an economic standpoint, the choice of 840 cycles and 400 volts seemed safe and reasonable. In considering converting power from conventional to these higher levels, three types of converters were considered, electronic, static and rotary.

Electronic converters are gen-

Close-up of lighting in reception area shows baffles used for sound control.

erally thought of as being transistorized. As announced or under development by several companies, this type of equipment may eventually prove practical. At present, costs are excessive, delivery is questionable and there are still problems in protecting the output circuit. It is difficult to predict when such equipment will be a practical reality.

Static converters lend themselves quite readily to high frequency lighting in respect to the advantage of having no moving parts and ease of obtaining wave forms to increase the efficiency of the circuits. At present, these units have poor power factor and voltage stability which creates some problems.

As of early 1959, the rotary type frequency converter has lower original cost without significant increase in operating expense. Its operation as a motor-generator driven unit is familiar to electricians and maintenance men who have a natural reluctance to service the unknown electronic and static types.

A principal fault of the early permanent magnet type frequency converters was fluctuation in voltage and variations in power factor. Since, with a three phase unit, loading of one phase affects that of the others, a special single phase rotary generator evolved to provide a corrected wave shape with high efficiency when used with capacitive ballasting. A separately excited field for voltage stabilization now makes one per cent regulation normal.

Switching High Frequency

Switching, on high frequency circuits, has caused some concern among design engineers. There are a number of ways in which this may be handled. A motor-starting switch is available, rated at 440 v, 20 amp, that will fit into a standard wall switchbox. If local switching of this type is desired, the 400-v system appears to be more convenient but this limits the designer to the use of four-foot lamps.

Another method of switching is by the use of low-voltage remote-control relays using devices rated at 600 volts with low-voltage holding coils. Straight panel-board switching with 600-v breakers can also be used.

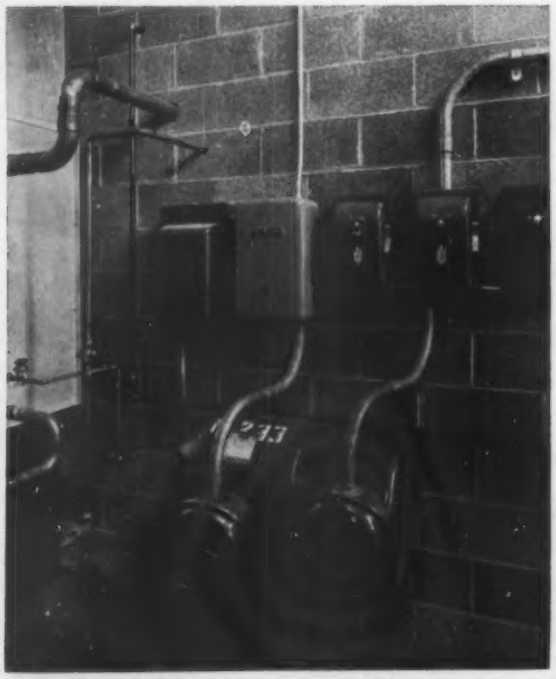
Protection of branch and feeder circuits operating on high frequency follows conventional practice. As an example, the General Electric Company tells us that their type F frame circuit breaker rated at 15 amp will trip at approximately 14½ amp at 840 cycles. The 20-amp breaker will trip at approximately 19 amp on high frequency service.

Using good 60-cycle design on 840-cycle systems leaves a safety factor that is more than adequate to cover the derating necessary for high frequency operation. It is interesting to note that we have experienced more trouble on installations using over-sized breakers than by having the high frequency overload the breakers sized according to standard practices.

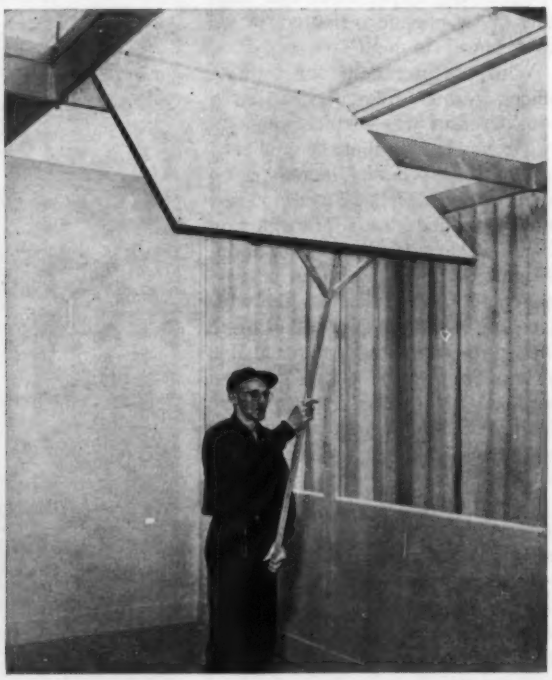
This same design concept holds true for sizing main feeders and branch circuit wiring. If good 60 cycle design is used on the 840 cycle branch circuits, both for wiring and circuit protection, no difficulty should be experienced.

When considering high frequency operation of a lighting system in a building in which air conditioning is to be used, there are a number of other economies possible. The

(Continued on page 268)



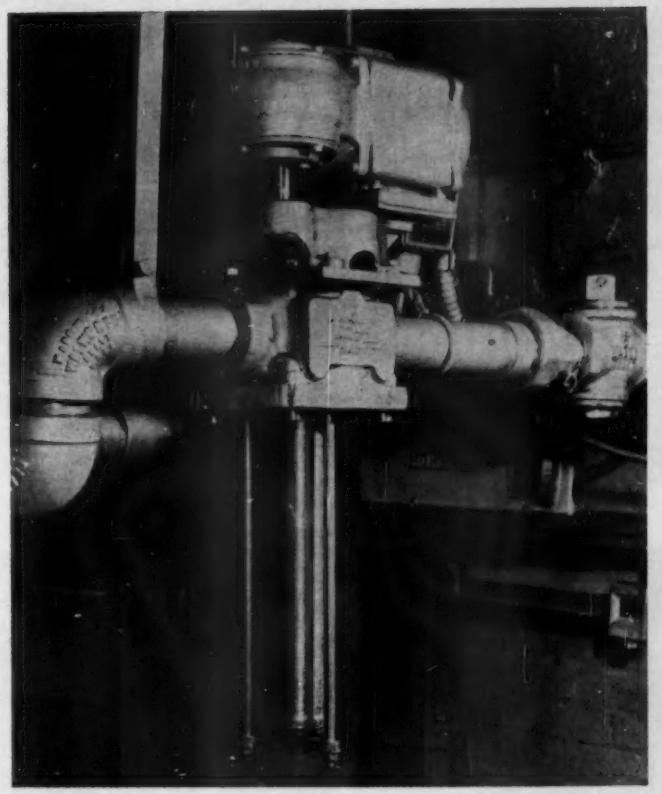
High frequency generator and associated control switches are located outside of the office area to reduce noise level.



Releasing two screws permits lowering metal-framed panel, simplifies maintenance of reflecting and diffusing surfaces.

STAINLESS FILTERS— THEY KEEP ON FILTERING

This article tells how, in corrosive environments, Type 304 stainless can keep processes operating



Shown above is a stainless steel metal-edge filter, with cover off, installed in the pipe line between a grease kettle and discharge nozzles. This filter helps to assure product cleanliness in high quality grease.

FILTRATION OF corrosive fluids is a problem common to many processing industries. Normally a simple operation, costs can rocket if filters must be replaced frequently. To the price of the replacement units must be added costs for labor plus a substantial sum for production downtime.

One way to reduce filtering costs is to revamp the process controls and eliminate the need for filtration. Perhaps this will prove a worthwhile change, but more often it will jump production costs beyond competitive levels. A simpler, less costly and easier-to-apply remedy is use of filter materials known to resist the effects of corrosive liquids.

Stainless steel and certain other more costly alloys, are designed for service in corrosive environments. Stainless alloys also are known for their strength, at times a necessary characteristic in high through-put filtration. Recently applied knowledge of stainless properties has led to a family of filters intended both for normal and abnormal filtration demands. One stainless filter in particular has found increasing use in a variety of processing operations.

According to the maker, Purolator Products, Inc., the unusual stainless filter finds wide use in nuclear energy reactors, where it can filter either de-ionized water or molten sodium with equal facility. Processors of chemicals and petroleum products employ the stainless filter, shown in photo, in removing unwanted particles from a corrosive liquid passing from one refining stage to another. Textile and papermakers find the filter suitable for separating foreign matter from aqueous solutions of acid or alkaline nature. In these uses, and others, the fluid medium often employed will readily destroy common filter materials.

A unit of this type not only is suitable for normal fluid filtration, but also is reported to perform at extraordinary rates of flow, even of highly corrosive liquids, through a subzero to elevated temperature range. Termed a metal-edge filter, it is constructed by spirally winding many yards of stainless alloy ribbon into cylindrical form.

Resistance of Type 304 stainless alloy to corrosion and to temperature extremes permits design of a filter suitable not only for conventional filtration, but also for many special services. Three needs in filtration pointed toward choosing Type 304 stainless: 1. Need for corrosion resistance both in normal and severe service conditions; 2. A metal that, when used in a filter, would permit full flow regardless of temperature variations; and 3. An alloy that could be formed and welded into a satisfactory filter.

Varying filtration needs call for assembly of some units capable of removing all particles 25 microns in diameter and larger. In metal-edge filters for 25-micron use, each stainless ribbon layer must lie a uniform 0.001 in. from its neighbor.

Spacing between metal ribbons in 500-micron filters must be controlled to 0.020 in. plus or minus 0.0005 in. **End**

REFRIGERATED PAINT HOLDERS KEEP EPOXY PRIMER USABLE

Dipping small parts, spraying large ones, saves money, improves product for Douglas Aircraft

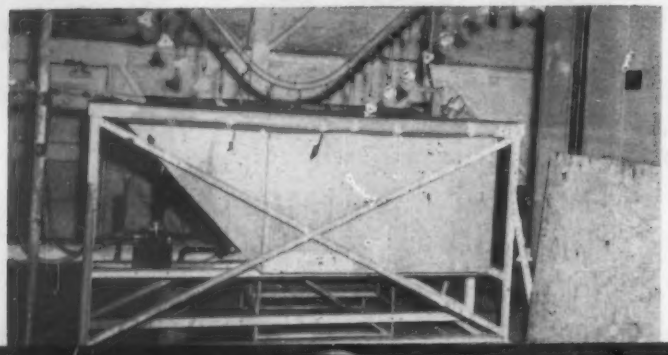
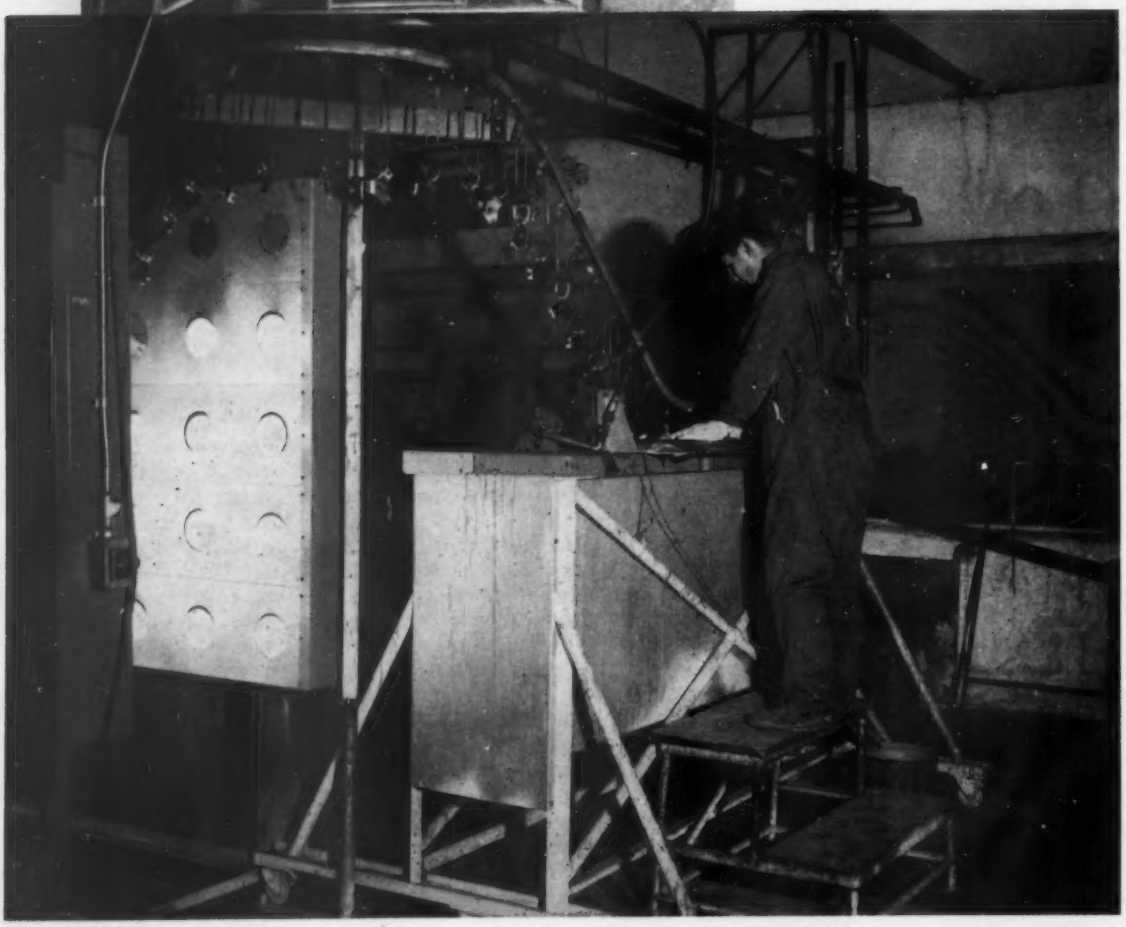
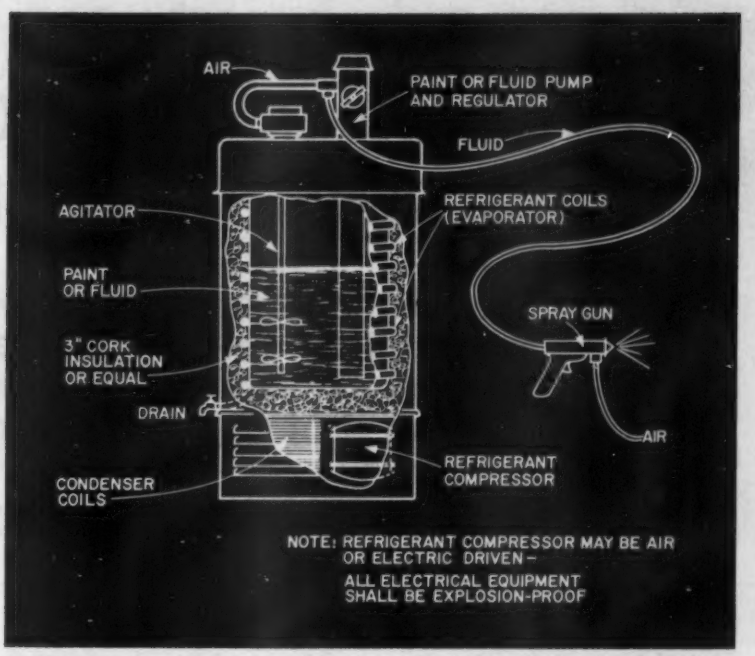


Photo at left shows side view of refrigerated dip tank. Liquid-tight outer cover contains refrigeration coils and brine. Large photo below shows small parts, heated to 120 or 130 F, leaving infrared lamp bank and entering refrigerated dip tank. Heat speeds polymerization of FR primer and provides even paint thickness on coated parts.





Drawing of refrigerated paint pot on which Donald Carr has applied for patent.

A SMALL 60-GAL refrigerated dip tank, 6 ft long, 10 in. wide, and deep enough so that a 24-in. long part can be immersed in it, is saving $200,000 a year at the Long Beach, California Division of Douglas Aircraft Company. The tank was designed and developed by Donald J. Carr, a Douglas plant engineer, and is used to apply a very hard, non-corrosive primer on all interior parts of the new Douglas DC-8 jet transport airplane.

Need for this refrigerated dip tank was generated by a chain of incidents. Because of its fire-resistant qualities, a fluid called Skydrol is used in the hydraulic system of the DC-8. But even slight leakage or spillage of Skydrol will remove ordinary paint and primer upon contact. To prevent this, a catalyst-type finishing material called FR Primer (trade name—Cat-A-Lac) is used on all interior parts.

This FR Primer contains a large percentage of epoxy resins, and polymerizes soon after application. Within 24 hr, it attains a glass-like hardness and is totally impervious to Skydrol hydraulic fluid.

The primer was first applied to the parts by hand spraying. But this proved to be a costly and troublesome technique. Approximately 90 per cent of the primer, costing $7.00 a gallon, was lost in overspray. Then this overspray would collect and polymerize on paint booth fixtures from which it had to be removed.

"For a while we were using more plumbers than painters in booths where the FR Primer was sprayed," Carr says.

A second difficulty arose from the fact that, even in bulk quantities, the primer would start to polymerize at room temperature within 8 hr after the catalyst was added. This made it necessary to mix it in very small lots, approximately a gallon at a time. And at the end of an 8-hr shift, any material left in the paint pots had to be discarded.

Donald Carr, an old plastics engineer himself, knew that polymerization of catalyst-type materials could be retarded by low temperatures. To affirm this, he placed some FR Primer, with catalyst added, in a refrigerator and held it for two weeks at 0 F. He then dipped test panels in the refrigerated primer to check results.

Tests With Heated Panels

With the test panels at room temperature, run-off was uneven with excessive thinning out near the top of the panel. Carr then tried dipping some heated test panels, knowing that the panel heat would speed polymerization upon contact. Results were all that could be desired.

This experiment set the stage for the new refrigerated dip tank and its auxiliary equipment. As already stated, the arc-shaped tank is 6 ft long, 10 in. wide, and deep enough so that a part 24 in. long can be dipped. Because of the high cost of the FR Primer (and due also to the fact that the dip tank was an experimental project), capacity was limited to 60 gal.

"We decided to continue spraying large panels by hand until all kinks were worked out," Carr explains.

The dip tank is refrigerated by a 5-hp compressor. The coils were wrapped around the tank and covered with thin sheet metal in a manner to form a secondary liquid-tight container for the coils only. This secondary container was then filled with brine to secure complete external dip tank coverage and maximum efficiency from the coils.

As the dip tank is small enough so that it can be moved in or out of position as required, it was decided to install it under an already existing finish line conveyor. A dip was engineered into this conveyor which would lower the parts through the refrigerated dip tank when it was in position. A bank of infrared lamps was installed on the up-line end of the dip tank to heat the parts just prior to dipping.

As it operates today, the FR Primer in the dip tank is refrigerated at approximately 35 F. The parts entering the tank are heated to 120-130 F by the infrared lamp bank. Beyond the tank, the parts

(Continued on page 276)

INVESTIGATE BEFORE YOU PLAN PLATING DEPARTMENT DESIGN

Layout of department, utility needs, drains, ventilation, anti-corrosive materials, costs and space considerations were thoroughly studied before plant engineering started its final design

By W. W. TOSSAVAINEN, Manufacturing Engineer, Distribution Apparatus, Dept., Westinghouse Electric Corp., Bloomington, Ind.

WHEN DESIGNING the distribution apparatus department plant in Bloomington, Ind., our planning engineers were faced with the problem of deciding whether all the plating and galvanizing should be done in the plant, or whether these needs should be handled by an outside company.

When it came to comparing the cost of each method, no choice remained but to study equipment purchases, installation costs, operating costs and annual return on investment, even though the final decision on whether or not the work should be done in the plant had not been made.

Each plating department was to fulfill a specific need and was limited by a peculiar set of restrictions. Although different arrangements of equipment would give us the same results process-wise, the installation cost would vary.

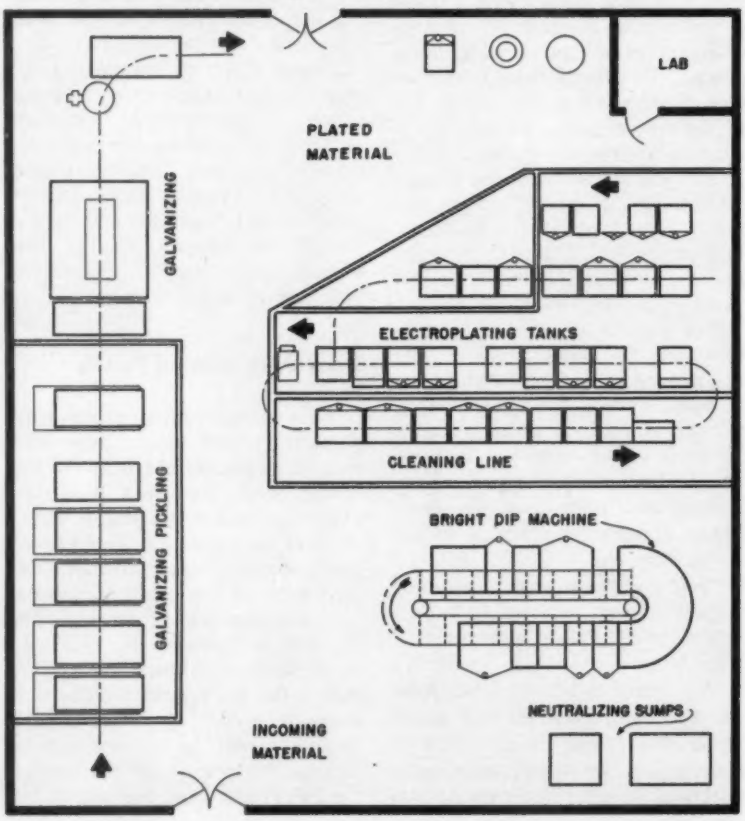
For instance, consider a small plating tank costing less than $100. This tank might require a cold water line, steam line, and drains for both; ventilation ductwork and hood; bus bars for d-c power; and an a-c outlet if a barrel plater were used.

Other costs that might far outweigh the original $100 are: a d-c rectifier or m-g set, acidproof floor beneath the tank, and facilities for treating the wastes from the tank. Since the cost of these services is determined largely by the location of the tank, it is imperative to have a well established layout before equipment costs can be determined.

We estimate that 75 per cent of the over-all planning of the facilities was completed before sufficient data was accumulated to permit management to decide whether or not the department should be designed by plant personnel.

Layout work began by surveying applied finishes in an attempt to reduce the total.

Fig. 1. Material flow in the plating room is in direction toward top of diagram.



For example, it was found that a tin immersion finish was being applied by means of alternate layers of tin anode and work boiled for an extended time in a solution of cream of tartar. A recent Westinghouse development applies a comparable thickness in a matter of minutes thereby permitting the process to be automated. Part of the galvanizing work was so large that only a commercial galvanizing concern could maintain a zinc pot large enough to handle the parts. These were immediately eliminated from the feasible items.

The galvanizing line was investigated first because of the great initial cost and the large space required. Hot zinc dipping can be a potentially hazardous operation and extreme caution should be used.

To conserve space, to decrease equipment costs, and to use some of the waste heat from the galvanizing line flue, a preheater table was built into the galvanizing setting. This arrangement also compensates, somewhat, for the high heating losses in winter due to heavy ventilation in the area.

Manual Handling Eliminated

Bright dipping of small circular nonferrous stamped items was formerly done by racking and hand dipping in baskets. Degree of cleaning, severity of acid etch, and effectiveness of rinse were all determined by the operators' discretion. An automatic, intermittent-travel, agitated-arm, bright-dip machine was purchased to increase production, maintain uniformity of process and eliminate the tedious manual handling involved. An operator now racks the pieces in a basket, hangs the basket on the machine, and removes a completed basket.

This machine features a variable or delayed "set-down" arrangement whereby the length of dwell in the nitric-sulfuric etch can be changed to suit the condition of the acid or varied as determined by the base-metal being processed.

A skip cam feature permits a tank to be bypassed simply by slipping a roller cam onto the basket arm at the time of loading. This made it possible to add a tank to the machine to do the nonferrous immersion tin plating referred to earlier, since the cleaning cycle is identical to cleaning prior to bright dip.

Electroplating required facilities to do both rack and barrel plating without duplication of equipment. For example, silverplate needs are high because large numbers of electrical contacts and conductors are required in distribution apparatus. Besides a barrel line, there was need for a still tank to permit plating the longer pieces not suited to barrel plating. In this case, a removable cathode rod installed in place of the barrel permits rack plating in a barrel line.

Future tank lines can be installed parallel to existing lines. The immovable equipment—galvanize setting, acid and cyanide sumps—are placed to permit future additions to the department without a major rearrangement of existing equipment.

Plating tanks are placed back-to-back to cut down the length of run on water, steam, and drain piping. Expensive bus bars are kept short by placing rectifiers directly behind the ventilated tanks they serve.

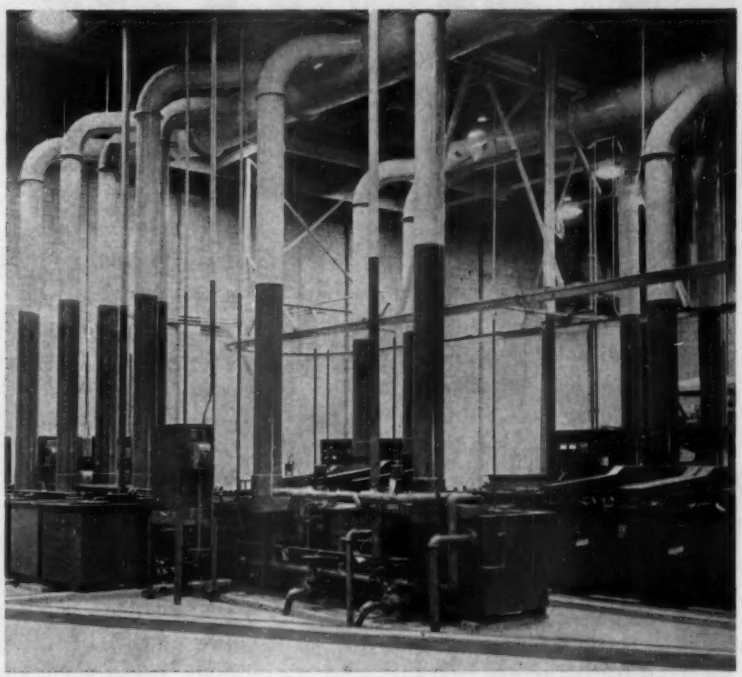


Fig. 2. General view of plating area shows auxiliary equipment which accounts for disproportionately high installation costs. Ductboards had not been installed.

A small portable barrel plater was also used for a few high-activity barrel parts that proceeded through the plating line. Some plating efficiency is lost with these arrangements and a wide range plating voltage source is required, but the compromise is justified by the versatility gained.

The plating room is arranged to keep traffic to a minimum (Fig. 1). Incoming material is dropped at the head of the lines while finished goods are picked up at the end of the lines. The plating lines are set up at right angles to the general flow of material to bring finished goods back to the main aisle.

Plating tanks are placed to permit waste segregation. For instance, all cyanide tanks are curbed to the cyanide drain and all acid-alkali tanks are curbed to the acid drain. This segregation affords maximum safety from inadvertent mixing hazards. Drains are oversized so that the existing waste facilities will not be overburdened when room expansion becomes necessary.

Segregating acid and alkaline wastes from the cyanide-bearing

(Continued on page 271)

The shrill sound of a horn
echoes in every shaft
to guard this mine's air supply against...

CUTOFF!

This is a Pennsylvania coal mine.

Deep down in the earth, hundreds of men are working at the raw sides of jagged black tunnels.

At the surface, three giant fans—each remotely situated in the surrounding countryside—send fresh air sprawling through the many miles of entryway.

The link between man and fan is 4½ miles of Rome control cable!

Engineers at this mine* selected Rome control cable for the nerves of a meticulously engineered control system that guards the mine's vital air supply. A winking light in the control room means everything is running smoothly. *But* . . .

A shrieking horn means trouble! Before gases can accumulate in the mine—jeopardizing the lives of hundreds—repair crews get the signal and start working on the failing fan.

Cable for a control system such as this must be the ultimate in reliability. "We've had experience with Rome's borehole cable and other types of Rome cable," says the chief outside electrician, "so I recommended Rome's control cable for this important job."

It went up very quickly—a crew of seven strung the first 16,000 feet over rugged, wooded and hilly terrain in only 14 days. That's *half* the time such an installation normally takes. The reason? Rome supplied a factory-assembled self-supporting-type cable to save the time and expense of on-the-job assembly.

You depend on cable, too. Just as this coal mine relies on cable to breathe, your plant relies on cable for production—to drive machines and other plant equipment. Like the mine, you can't afford to take chances on power failures.

Rome Cable manufactures various types of thermosetting and thermoplastic control cables to meet specific electrical, environmental, installation and economic requirements. Call your nearest Rome Cable salesman today for help in selecting the precise cable you need.

*Name of mine furnished on request.

MEET THE MAN

WHO'S DEDICATED TO YOUR JOB

YOUR ROME CABLE SALESMAN

ROME CABLE

CORPORATION

For more facts circle 567 on Reply Card

Fig. 1. Standard steel building, modified by substitution of flat roof panel, carries conditioned air 168 ft across roof.

STEEL BUILDING IS ROOFTOP AIR DUCT

COMPLETELY air-conditioning a manufacturing plant after it was built, and while it was operating . . . that was the problem faced by Technicon, Inc., at Sylvania Electric Products' plant in Burlington, Iowa. One part of the solution was the installation of air ducts outside the building, on the roof, rather than in the ceiling areas where they are usually found.

The manufacturing area, maintenance department and cafeteria are air-conditioned by two nominal 140,000 cfm, two-bank spray washers. The air is first filtered and then washed, cooled and dehumidified in the spray washers. Two axial-flow fans circulate the air to two monitor ducts located on the roof.

Branch ducts from the monitors take conditioned air through the roof, to 24 zones, in a "plug-in-duct" system.

The monitor ducts—actually, steel buildings set on the roof of the main building—are an interesting innovation in construction. Each of the two monitors is an Armco building (normally sloping-roof) modified by the use of a standard building panel as the roof, to provide a rectangular duct. Each complete duct is 168 ft long and 6½ ft high; for the initial 100 ft of its length it is 12 ft wide, then narrows to 6 ft in width. **End**

Booth Brothers and Co., Inc., designers of the system, gave these answers to questions posed by PLANT ENGINEERING:

1. *How does the cost of the steel building compare with that of conventional duct?*

"We have found that the building would possibly be a little more expensive than conventional ducts. However, the additional cost is offset by improved appearance, ease of installation, ease of insulation and structural stability."

2. *How much extra weight was involved, and what structural bracing, if any, was required to support the extra weight?*

"A duct having the same air capacity as the Armco monitor ducts would have weighed more, due to the heavy gage metal required for the sheets plus the additional weight of angle iron reinforcing. With the building, due to its construction, no additional bracing was required. No additional structural bracing was required in the roof to support the weight of the structure.

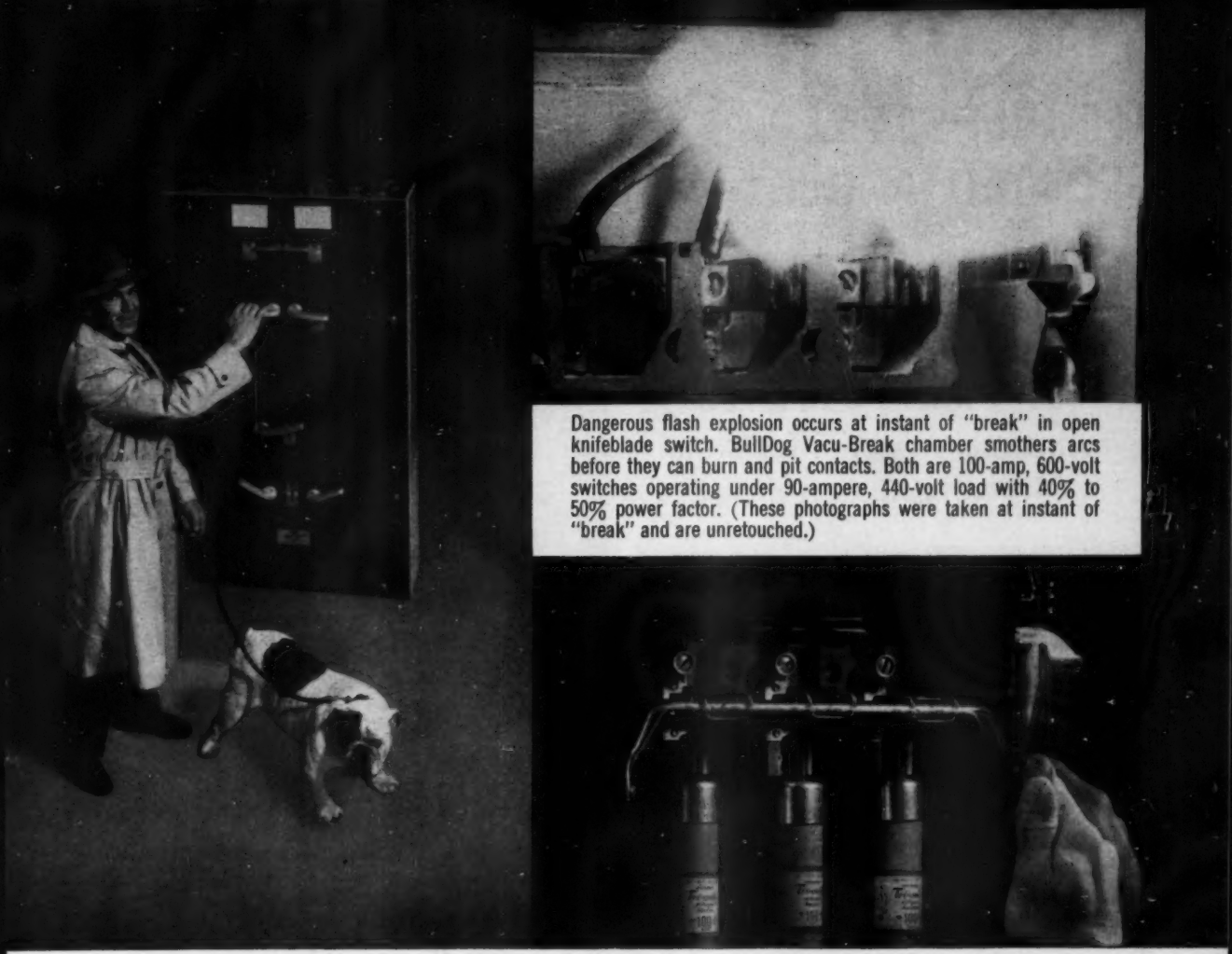
3. *What is the flooring inside the building-duct?*

"The floor of the duct is actually the existing roof of the building—poured gypsum with built-up roofing.

4. *Is it an all-galvanized system?*

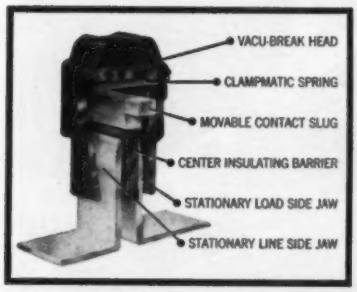
"The duct is all galvanized. The interior is lined with two inches of coated Fiberglas for thermal insulation and sound attenuation."

Fig. 2. Dual building-ducts supply 24 zones in plant air-conditioning system.



Dangerous flash explosion occurs at instant of "break" in open knifeblade switch. BullDog Vacu-Break chamber smothers arcs before they can burn and pit contacts. Both are 100-amp, 600-volt switches operating under 90-ampere, 440-volt load with 40% to 50% power factor. (These photographs were taken at instant of "break" and are unretouched.)

FOR SAFETY'S SAKE BUY VACU-BREAK POWER PANELS



Close-up of Vacu-Break head shows movable contact slug inside the compact arc chamber. The Clampmatic spring assembly assures a bolt-tight contact, helps speed "break". This combination guarantees positive and safe operation, long switch life.

You switch with safety when you choose BullDog Power Panels with Vacu-Break* switch units! Exclusive Vacu-Break design houses contacts in compact arc chambers that limit the oxygen supply . . . actually starve the arc before it can explode and pit or burn contacts. Maintenance is practically eliminated.

Contacts in the Vacu-Break unit are attached directly to the operating handle for positive, safe switching every time. When the handle is in the OFF position—you know the switch is *off!* For extra safety the units have interlocking doors. The Vacu-Break unit also provides clamped-pressure switching contacts to prevent overheating. Clampmatic* design simulates a *bolted connection* when in the ON position . . . accelerates the break, too!

In recent tests, Standard BullDog switches with Amp-Traps** were subjected to 100,000-amp short circuit current. They were undamaged! You can get this extra safety and long-lasting performance by specifying BullDog Vacu-Break Power Panels.

BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY
BOX 177 • DETROIT 32, MICHIGAN

In Canada: 80 Clayson Rd., Toronto 15, Ont. Export Division: 13 East 40th St., New York 16, N.Y.

*Vacu-Break and Clampmatic are registered trademarks of the I-T-E Circuit Breaker Company. **Amp-Trap is a registered trademark of the Chase-Shawmut Company

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THE VERSATILE SLOTTED ANGLE

Continuing to grow in popularity, the slotted angle provides any plant engineering department with a nearly universal material for small plant-construction projects

BENCHES OR BINS, racks or stands, it doesn't make much difference to slotted angle material. It has been used for all of these and many more around-the-plant items and the end of its versatility hasn't been reached yet. Shown on these pages are just a few of the uses to which a new product of The Rapids-Standard Co., Inc., has been put. Flexibility in design to fit specific conditions is just one advantage of the slotted angle. **End**

In this flat-stock rack shelves were positioned on 6-in. increments to provide storage for different types of sheet.

This overhead guard support provides a framework for personnel safety. Here it is used under an overhead conveyor system. Materials that come loose or spill from the conveyor are caught on a wire screen bed. Cleats used to suspend the hangers were fastened to the ceiling with 5/16 in. lag bolts. Horizontal supports were bolted to vertical hangers with long flange down. Bolting room for fastening screen bed to framework was provided by ¾ in. bolt spacing.

NO TROUBLE CALLS WITH PUSHMATIC . . .

bolted connections are standard on every breaker

Ever hear of "nuisance tripping" in circuit breakers? It occurs regularly in many plants — boosting maintenance, hampering production, costing plenty. But not when Pushmatic® is on the scene. Here is a circuit breaker that thinks for itself — that puts an end to trouble calls. And here's why...

The double-safe Pushmatic breaker *bolts* to a bus bar . . . cannot work loose and cause excessive heating. It provides a high-pressure, low-resistant, *positive* connection always.

No complicated installation either. It can be installed simply and quickly by merely tightening a captive screw onto the bus bar.

Other Pushmatic plusses: Pushbutton convenience and control . . . quality you can depend on. More than a dozen individual tests are given each and every Pushmatic before packaging. The result is *proved* performance *every* time. Get Pushmatic and end trouble calls.

BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY
BOX 177 • DETROIT 32, MICHIGAN

In Canada: 80 Clayson Rd., Toronto 15, Ont. Export Division: 13 East 40th St., New York 16, N.Y.

For more facts circle 569 on Reply Card

Man-Made Lightning Powers Underwater "Spark Bomb" To Form Metals

A DEVICE THAT CREATES "underwater lightning" to convert electrical energy into mechanical power without the use of electrical motors of any kind has been developed by Republic Aviation Corporation.

The "spark bomb," as it is called, stores up electrical energy and then within 40 millionths of a second releases it with a force equal to 6000 horsepower, according to the company's director of manufacturing research. This energy is being used experimentally for certain metal-forming operations that normally employ conventional motor-operated hydraulic press equipment.

Significance of the "spark bomb" development is that it offers a potential solution to the problem of working with high-strength metals used in the production of advanced aircraft and spacecraft. Some of the newer steel and titanium alloys and other exotic materials, with practically no "stretchability," require complicated equipment of tremendous force to shape them to the close tolerances and aerodynamic smoothness needed. And, he said, high-pressure "explosive forming" appears to be a method of obtaining this magnitude of force from simple and inexpensive equipment, employing the "shock wave" power created by the lightning flash.

The device's detonator operates on the same principle as lightning; that is, it's a high-voltage spark. Electric power is fed into a battery of capacitors. Wires from the plus and minus terminals of the capacitors are attached to two electrodes immersed in water. When a discharge switch is released, the "explosion" occurs, complete with lightning flash and thunderclap. The resulting spark travels through the water at extremely high velocity, creating a shock

wave. It is this shock wave that actually does the forming work.

Although engineers have speeded up the spark bomb's release time to 40 millionths of a second they hope to reduce the time factor even more as experiments continue. This, they said, will mean still greater horsepower than they're getting now.

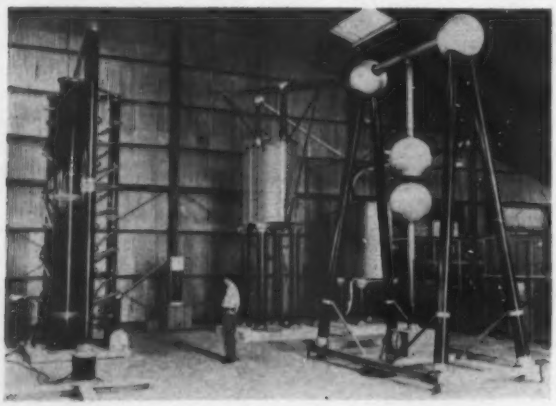
Republic is working toward eventual development of the device as a standard machine, too, on the premise that such a tool, costing about $50,000, will replace a conventional hydraulic press that costs about half a million dollars.

New West Coast Laboratory Handles the "Big Ones" in Voltages

ONE OF THE LARGEST high-voltage development laboratories in the West Coast area has been placed in operation at the Kelman Power Circuit Breaker Div., Los Angeles, of I-T-E- Circuit Breaker Co.

The new facility, capable of surge testing to voltages as high as 1,500,000, also incorporates the only high-current testing setup on the West Coast. It will provide a key testing tool at the division's disposal, for development of new products, and will also be available to regional utilities and industrial firms for advanced testing of a wide range of materials and components.

The Kelman line of breakers, used principally by electric utilities, ranges in voltage from 14,400 through 230,000 volts, and in interrupting ratings from 100 mva to 15,000 mva. These breakers are used to take power directly from utility lines at high voltages.



The new laboratory will decrease the time required for research and testing from the development stage to actual production and will permit acceleration of general studies of parts, components and materials at higher voltages.

New lab facilities will also provide the foundation for future studies at even higher voltages, to keep pace with the mushrooming trend toward higher voltages by electrical utilities throughout the country.

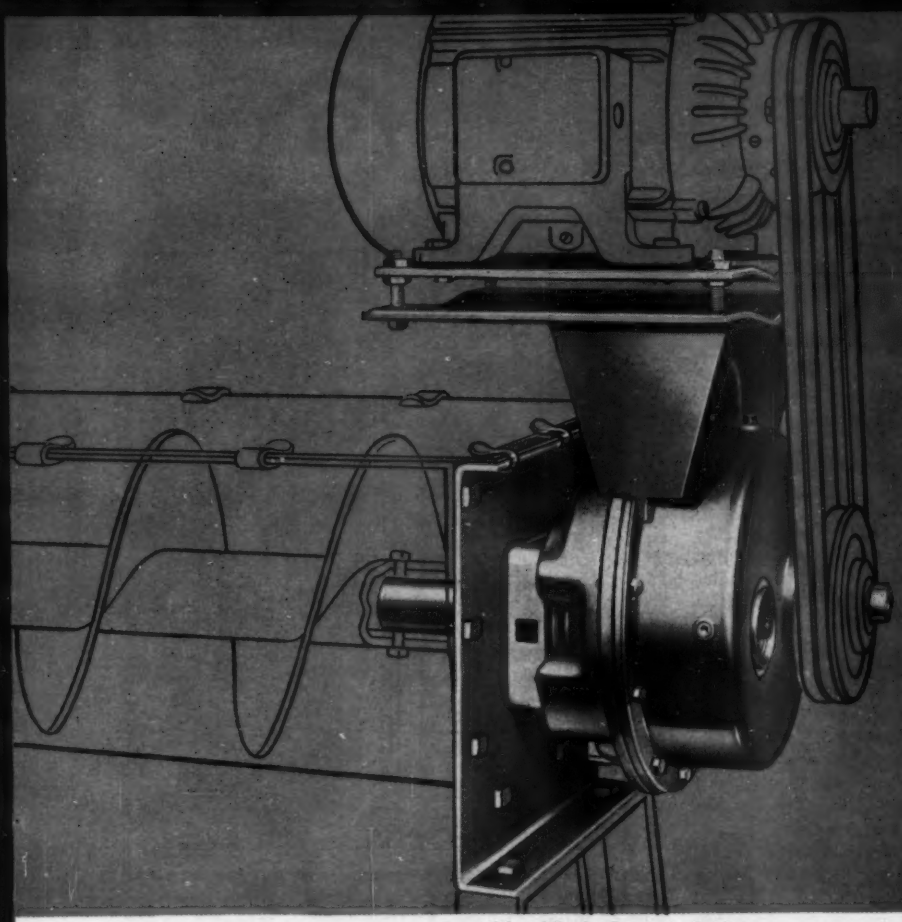
Equipment which has been installed in the new laboratory will be able to perform the following tests:

1. High voltage power frequency. This facility consists of two transformer units, each producing 333,000 volts, connected in cascade to provide a total of 666,000 volts. Input voltage to the transformer equipment is 480 volts at 60 cycles.

2. High-voltage impulse. This consists of a surge generator which duplicates the steep wave front of lightning. A total of 1,500,000 volts can be produced by the discharge of power held in eight condenser sections. The sections are charged in parallel by a 200,000v rectifier, then connected in series for discharge.

3. High-current. This test set consists of an arrangement of transformers which provide high currents—up to 200,000 amperes—at low voltage for various short-time current tests on all types of switchgear. Primary voltage is 20,000 volts.

In addition, the laboratory will also house comprehensive equipment and facilities for such design tests as heat runs, mechanical operation and material checks.



NEW! FALK Screw Conveyor Drive

U.S. and Foreign Patents Applied For

—the drive our customers asked for

Our customers helped us design this new unit. We sent our men into the field to find out what our customers needed in a screw conveyor drive—then our engineers designed a new drive that offers the maximum of service, versatility, operating economy and long life. Here are some of its outstanding features:

A COMPLETE DRIVE: Saves engineering and assembly time. Six sizes to cover entire range—each with these ratios: — 4:1, 9:1, 14:1 and 24:1. Bolts to any standard trough end—eliminates trough end bearing. Eliminates drive shaft wobble. Efficient FALK single helical gears.

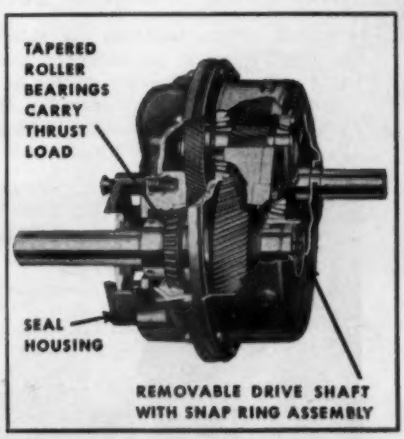
SEAL HOUSINGS: Choice of seals (neoprene or leather lip, felt or waste) to accommodate material conveyed. Space between trough seal and unit seal prevents conveyed material from reaching unit seal.

REMOVABLE DRIVE SHAFT: Snap ring assembly permits easy removal. Five sizes, from 1½" to 3⅞".

TROUGH END: Can be fastened to any standard trough. Eight sizes, from 6" to 20".

ALL-STEEL MOTOR MOUNT: Saves costly engineering and installation time and costs; no motor plates to design or fabricate. Motor can be mounted in virtually any position. Pre-drilled to accommodate NEMA standard motors ½ to 30 HP.

AN IMPORTANT ECONOMY: Buy only what you need—the basic reducer alone, or with trough end and/or motor mount. For detailed information, contact your Falk Representative or Distributor—or ***write direct for Bulletin 7106.***



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MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

Representatives and Distributors in most principal cities

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FALK

...a good name in industry

Remote-Controlled Machine Replaces Man in Radioactive Areas

THE MOBOT MARK I, called the first operable machine to be both mobile and remote-controlled (by an operator in another room or building) will be delivered to the AEC by Hughes Aircraft Co., its developer.

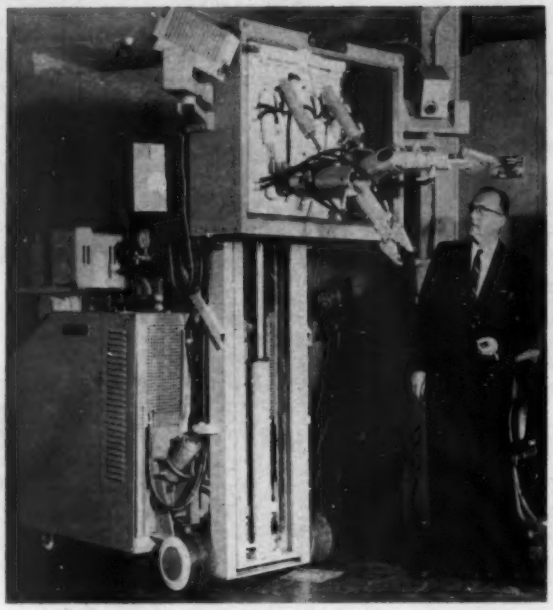
It will be used in a nuclear reactor that will be operated at 5 million watts, behind dense concrete walls and a door weighing half a million pounds. The handling arm assembly, with wheels and appropriate controls, is the only equipment which operates in the radioactive area. A cable extension on a reel connects the handling equipment to an operator's console.

All controls, signals, and data transmission, as well as power, travel to and from the mobile equipment and the operator's position through a tri-axial cable 200 feet long. Over 100 commands may be sent to the Mobot handler through this cable. Power for the handling equipment is 7.5 kva.

The vehicle has its own battery and d-c motor. Provision is made for automatic trickle charging of the battery. Power is transformed to a higher voltage at the console before it is sent through the cable. Transformers and rectifiers in the vehicle provide necessary operating voltages for the handling equipment. Signal multiplexers are located in the vehicle and operator's console station. All Mobot commands go through these units and the cable.

The equipment is designed to pick up mechanical components, electrical objects, soldering irons, voltmeters, etc., used in semi-hot radiation testing areas. Normally, equipment which has been irradiated is removed from the irradiation area and transferred by the Mobot to a hot laboratory. Extreme mobility, including the equipment's three-ft horizontal and 10-ft vertical reach, make it a versatile remote handler in most environments where man cannot work because of hazardous conditions.

Two remote-controlled TV "eyes" are provided to take the operator's eyes and mind into the hazardous area. Remote control pan (270 degrees), tilt and focus are



provided separately and independent of the two handling arms. Handling arms are hydraulically operated and capable of lifting 150 lbs. A lifting hook is provided on the lift mechanism to handle weights up to 1500 lbs.

Four-speed control with complete steering is provided in the vehicle power assembly. Two separate hydraulic systems are used, one for the lift mechanism and the other for handling arm assemblies. Electro-hydraulic controls especially adapted for this purpose were developed by Hughes Aircraft Company personnel.

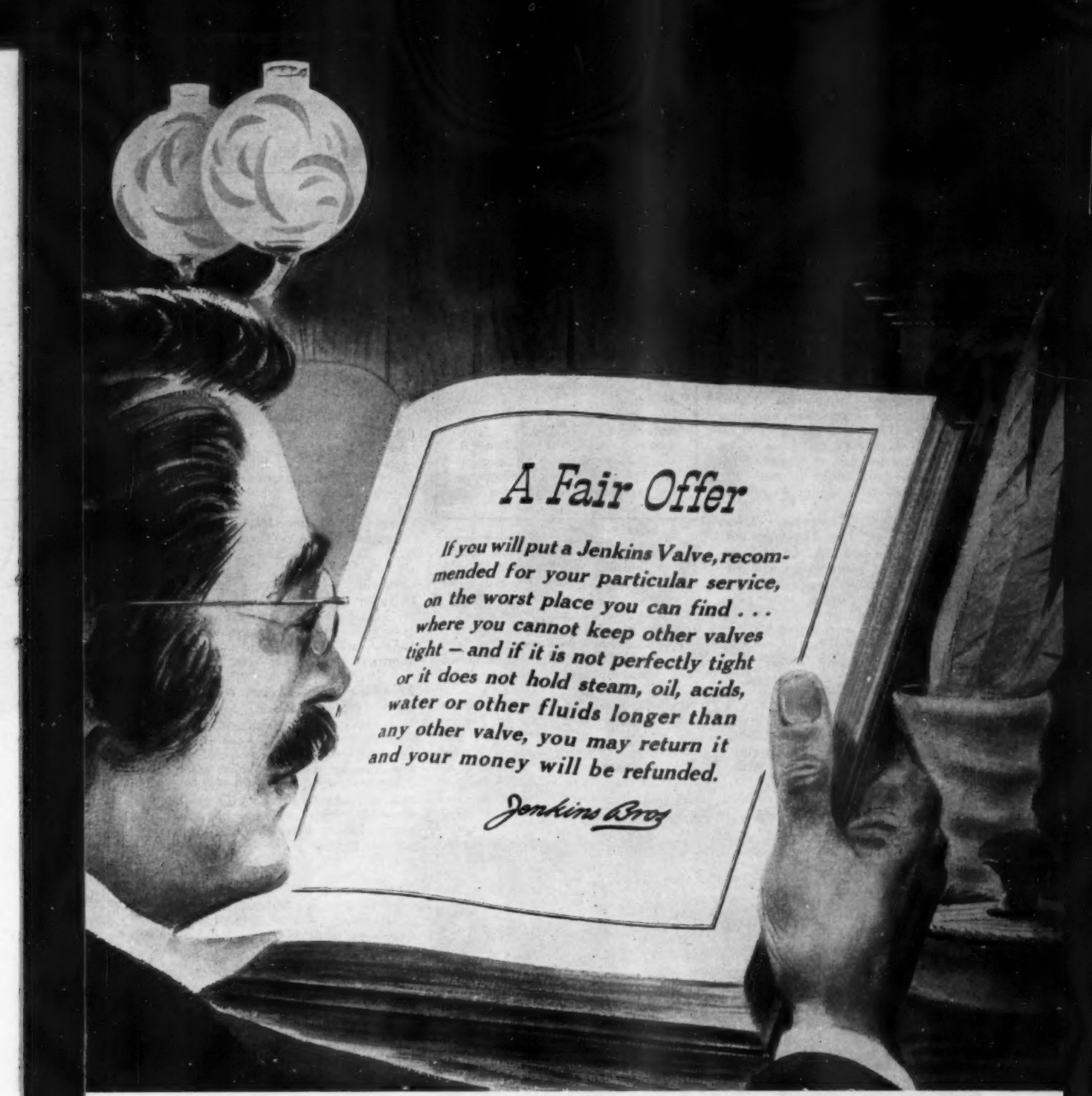
"Motionless" Pump for Sodium Takes World's Largest Permanent Magnet

SCHEDULED TO WORK in the atomic energy program, the world's largest permanent magnet will help pump liquid sodium in a breeder reactor to be operated by the Argonne National Laboratory for the Atomic Energy Commission. To be known as Experimental Breeder Reactor II (EBR-II), this reactor will produce electrical power on the test site located near Idaho Falls, Idaho.

The magnet was made by the Arnold Engineering Co., Marengo, Ill., a subsidiary of Allegheny Ludlum Steel Corp. It weighs 1720 lb, and is made of Alnico V material. With overall dimensions of 52½ by 36 by 10 in., it has a gap length of 16½ in. and a gap volume of 1584 cu in. The density at the center of the gap is 1100 gausses. About 500,000 ampere turns were needed to magnetize the unit.

Although it is customary to use an electromagnet in pumping the liquid sodium in reactor applications, in this pump the permanent magnet is required because the magnet itself will be completely surrounded by the liquid metal.

The sodium used in the reactor acts as a heat transfer medium or coolant—it absorbs heat from within the reactor, then it is pumped outside to heat water in a heat exchanger or boiler. The magnet will help in the pumping of the highly radioactive sodium at elevated temperatures. The pumps operate without moving parts, by the interaction between a current passing through the sodium at right angles to a strong magnetic field. This interaction produces a force which moves the sodium through the closed piping system that serves as a "reservoir" for the sodium supply.


A Fair Offer
If you will put a Jenkins Valve, recommended for your particular service, on the worst place you can find . . . where you cannot keep other valves tight — and if it is not perfectly tight or it does not hold steam, oil, acids, water or other fluids longer than any other valve, you may return it and your money will be refunded.
Jenkins Bros

PUBLISHED AND PROVED FOR 90 YEARS

This simple, straightforward statement of selling policy was first published in 1869, five years after Jenkins Bros. was founded. It has been continued in full effect through 90 years of Jenkins Bros. history of making valves to a standard of quality that warrants such an unparalleled assurance to buyers.

SOLD THROUGH LEADING DISTRIBUTORS EVERYWHERE

JENKINS VALVES

LOOK FOR THE JENKINS DIAMOND

JENKINS SINCE 1864

Jenkins Bros

For more facts circle 571 on Reply Card

NEW PLANT CONSTRUCTION —advance information on location, costs

Decatur, Ala.—Minnesota Mining & Manufacturing Co., 900 Fauquier Ave., St. Paul, Minn., plans to build a chemical facility to produce fluorochemicals as well as special chemicals for internal use. Work on the new facility has already begun and is scheduled to go into production by early 1961. Cost will be about $4.5 million.

Chandler, Ariz.—Southwestern Nitrochemical Corp., jointly owned by Southwestern Agrochemical Corp. and First Mississippi Corp., plans to construct a large anhydrous ammonia plant on a 10-acre site located here. Plant will have an initial capacity of about 80 tons per day and is scheduled to go into production by mid-1960. Cost reported to be about $4 million.

Anaheim, Calif.—Thompson Ramo Wooldridge, Inc., Los Angeles, Calif., plans to build a large aircraft and missile components plant which will consolidate and expand its Tapco Group division's West Coast operations. Work on the new plant will get under way at once at a reported cost in excess of $2 million. Plant is expected to go into production in 1960.

Manhattan Beach, Calif.—Pacific Semiconductors, Inc., 10451 W. Jefferson Blvd., Culver City, Calif., plans to construct a plant here for the production of various company products. Work will begin soon and is scheduled for completion by early 1961. Plant and equipment will represent an investment of $6 million.

Correction

The company in one of the New Plant Construction items in the August issue was incorrectly identified as the General Tire & Rubber Company. The corrected item appears below:

Akron, O.—Goodyear Tire & Rubber Company, 1144 E. Market St., plans a multi-million dollar expansion program of company's Goodyear Aircraft Corporation facilities for the manufacture of vinyl plastic flooring. Expansion program will more than double its present vinyl plastic flooring and counter top production capacity here.

Richmond, Calif.—California Chemical Co., a subsidiary of Standard Oil Co., of California, 225 Bush St., San Francisco, Calif., plans to construct a maleic anhydride production plant at company's refinery located here. Described as a multi-million dollar facility, the new chemical plant is scheduled for completion by 1960.

North Clymont, Del.—Sun-Olin Chemical Company, jointly owned by Sun Oil Co., Philadelphia, Pa., and Olin Mathieson Chemical Corp., Baltimore, Md., is constructing an $8-million facility for the production of urea. Product is used for fertilizers, animal feed and many industrial uses. Plant, scheduled for completion before the summer of 1960, will have a capacity of 73,000 tons annually. M. W. Kellogg Co., Fabricated Products Division, 711 Third Ave., New York, N. Y., will construct the plant.

St. Marys, Ga.—Gilman Paper Co., 630 Fifth Ave., New York, N. Y., has announced that the Kraft Bag Corp., a subsidiary, has plans under way for the construction of a paper converting plant. The 300,000-sq ft facility, reported to be a multi-million dollar investment, will produce multi-wall shipping bags and grocery bags of all types. Plant is under the supervision of S. S. Jacobs Co., Jacksonville, Fla. Work will begin at once for completion by late 1961.

Cairo, Ill.—American Agricultural Chemical Co., 50 Church St., New York, N. Y., plans to construct a plant for the production of sulfuric acid. Construction of the new facility will begin at once with completion slated for March of next year. New unit, to cost about $750,000, will boost company's total sulfuric acid capacity by approximately 10 per cent.

Effingham, Ill.—Norge Division of Borg Warner Corp., Merchandise Mart, Chicago, Ill., is constructing an addition to company's existing facilities here for the manufacture of ranges and laundry machines. New addition will have a floor area of 139,250 sq ft and will add 33 per cent to available manufacturing and assembly floor space. Target date for completion is set for 1960 at a reported cost of $1 million.

Kankakee, Ill.—A. O. Smith Corp., 3533 N. 27th St., Milwaukee, Wis., is constructing a major addition to company's plant on local site here. Plans call for the addition of 164,000 sq ft to existing facilities. Cost of new addition will be about $2.1 million.

Portage, Ind.—Midwest Steel Corp., National Steel's new subsidiary, has announced plans for the rolling of steel for the first time early in 1961. Company has just broken ground for new mill here. New facility, a finishing mill in its first stage, ultimately will be expanded into a fully integrated mill. New plant will represent an expenditure of $103 million.

Blue Rapids, Kan.—Bestwall Gypsum Company, Ardmore, Pa., will build a new gypsum plant here to replace present facilities. Work on the new plant is already under way and is scheduled for completion in July, 1960.

Baltimore, Md.—Du Pont Company, Du Pont Building, Wilmington, Del., plans to construct a research center

(Continued on page 274)

Construction of single strand sinter plant has been started by Dravo Corporation of Pittsburgh at the Aliquippa Works of Jones & Laughlin Steel Corporation. The sinter strand will be 13 ft, 2 in. wide, with 2419 sq ft of hearth area. New plant, scheduled for 1960 completion, will produce 6500 tons of sinter daily.

WE WON'T HAVE ANY TROUBLE KEEPING THIS BEARING LUBRICATED— —THANKS TO DISTRIBUTOR DAN THE SKF BEARING MAN

"He recommended a centrally-lubricated spherical bearing," the mechanic told the foreman. "The lube goes directly to the rollers and races—and it flushes the old lube and dirt *away* from the bearing. When it comes to bearings, Distributor Dan sure knows all the answers."

Authorized SKF Distributors can help keep bearings running smoothly, longer, because they offer a complete bearings maintenance service. And they can promptly supply the bearings you need from their large, diversified stocks.

Why not find out exactly how the nearest Authorized SKF Distributor can help you? Ask him to call today. 5922

Spherical, Cylindrical, Ball, and "Tyson" Tapered Roller Bearings

EVERY TYPE—EVERY USE

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A REPORT TO MANAGEMENT ON HOW

Industry cuts costs with FIR PLYWOOD

ROUTE TO:

- ☐ ENGINEERING
- ☐ PRODUCTION
- ☐ SALES
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- ☐ MAINTENANCE
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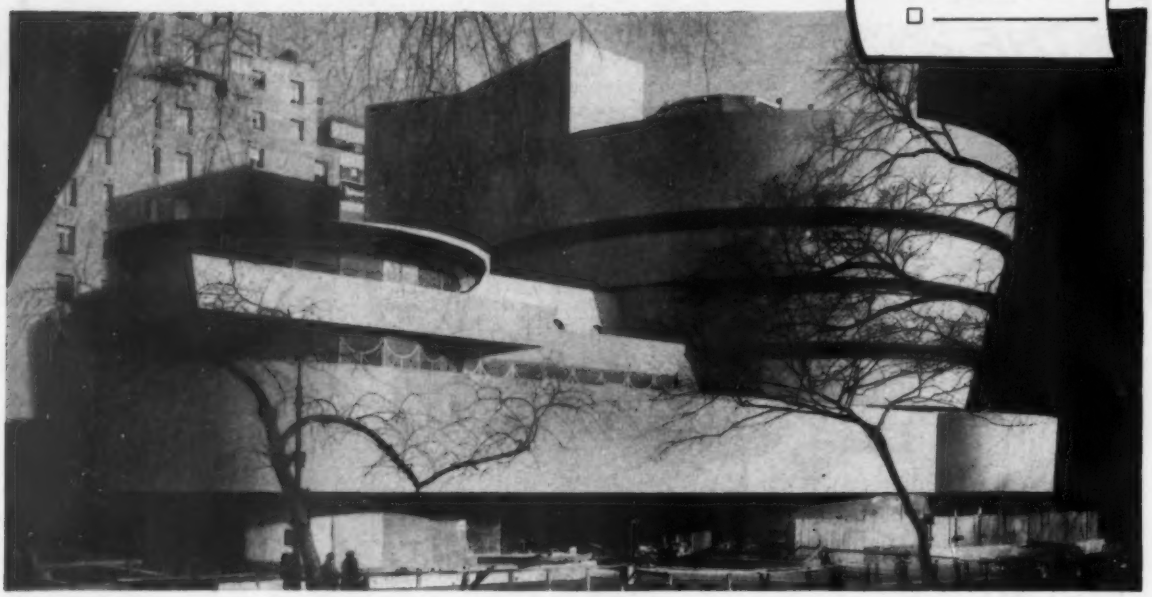
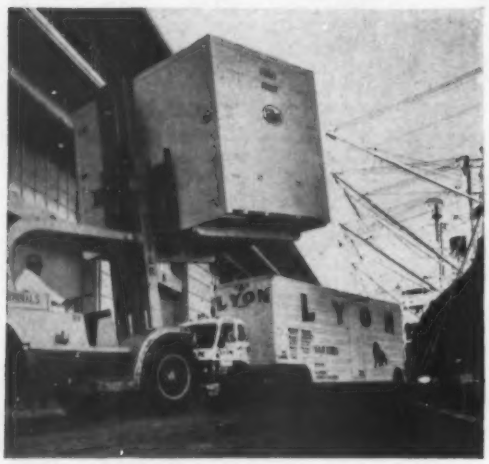
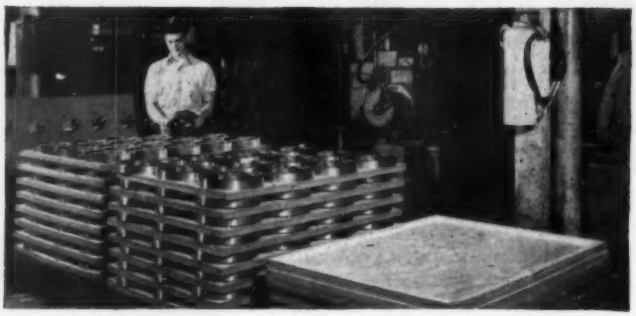
- ☐ _____





Over seas with safety-plus go home furnishings in huge fir plywood "Sea Pak" containers developed by Lyon Van Lines, world-wide movers. Exterior fir plywood was chosen to replace aluminum after passing rigorous impact and weathering tests.

Curves create problems for concrete contractors—but fir plywood forms help provide the solution. Nowhere is this better demonstrated than on the new Solomon E. Guggenheim Museum, New York City, designed by Frank Lloyd Wright and built by the Euclid Contracting Corp. Job superintendent Charles Spero reports, "This job could not have been done without fir plywood concrete forms."



Light-weight protection for tractor and motor grader parts is afforded by these inexpensive fir plywood separator trays. Allis Chalmers Manufacturing Company currently uses about 12,000 in its Springfield, Ill. plant, and has used them for the past five years. They speed inventory and handling, protect parts in transit.

FOR MORE INFORMATION about fir plywood—its uses, properties and advantages—write

DOUGLAS FIR PLYWOOD ASSOCIATION

TACOMA 2, WASHINGTON

—an industry-wide organization devoted to research, promotion and quality control

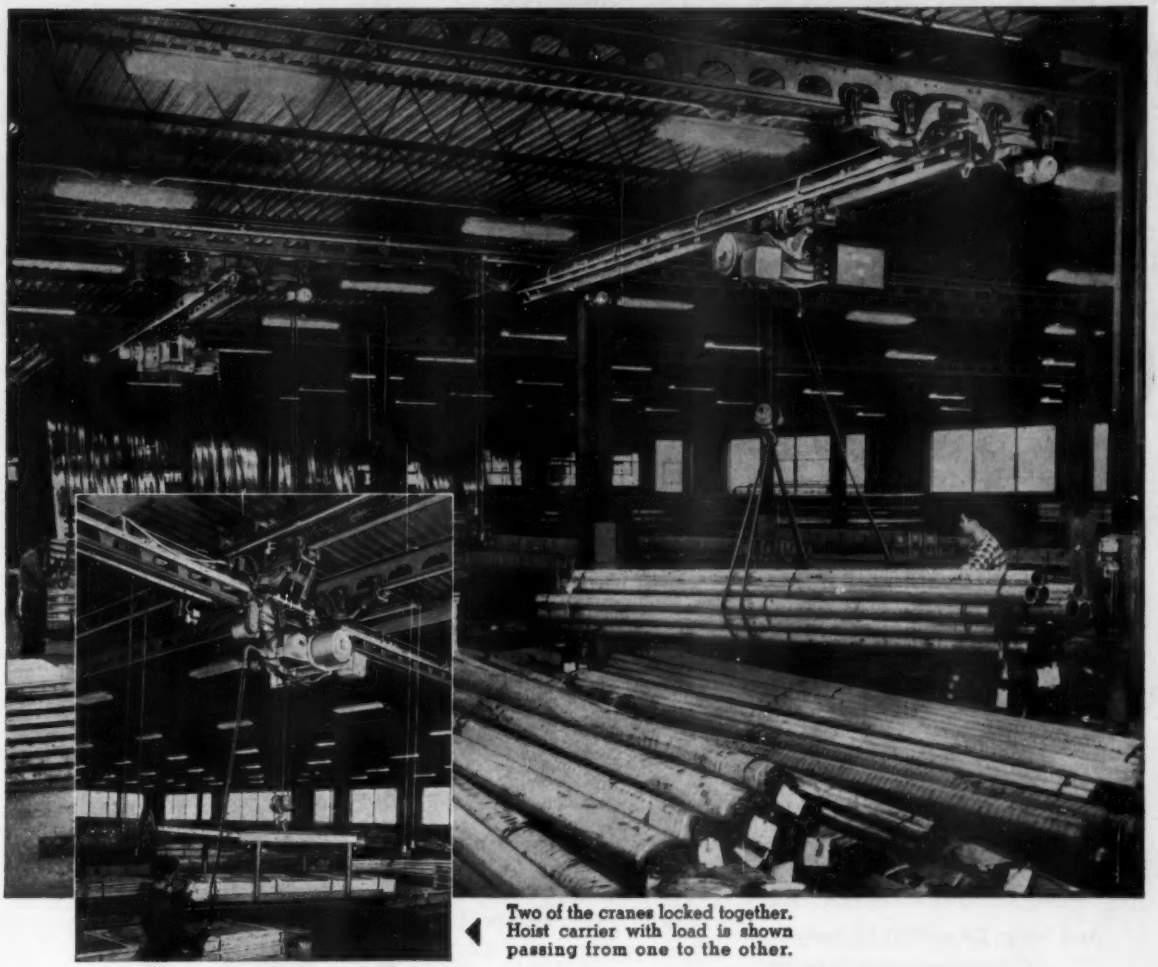
DFPA TESTED QUALITY

Always specify by DFPA grade-trademarks

For more facts circle 573 on Reply Card

Large bundles of pipe, sheets, etc., are quickly handled from receiving dock to any spot in the warehouse *without rehandling* by the overhead Cleveland Tramrail transfer cranes. Whitehead Metal Products Co., Inc. specialize in a wide variety of nonferrous metals.

TRAMRAIL CRANES
SAVE WAREHOUSE SPACE
Improve Materials Handling Efficiency



Two of the cranes locked together. Hoist carrier with load is shown passing from one to the other.

In the large modern warehouse of Whitehead Metal Products Co., Inc., Cambridge, Mass., the entire job of unloading incoming materials, placing in storage and handling for outgoing shipments is done with Cleveland Tramrail transfer cranes.

The cranes have proven most practical for this service. They can transport long, unwieldy bundles of pipe in much narrower aisleways and turn them ninety degrees for piling without need of wide turnaround areas. As a result, an important amount of floor space is saved, and this provides considerable additional storage capacity.

Three cranes on separate, adjacent runways are used at Whitehead. However, there are only two hoist carriers, one of two tons, and the other of three tons capacity. Either can be transferred to any crane. The equipment is completely motorized, push-button operated. Conductors are SAFPOWRBAR. (SAFPOWRBAR electrification has been approved by the Underwriters Laboratories, Inc. and the Canadian Standards Association.)

Hundreds of warehouses handling materials of nearly every kind are profiting by installations of safe, dependable, time-saving Cleveland Tramrail cranes and track systems.

Write for free Engineering and Application Booklet No. 2008. Packed with valuable information.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 7545 E. 290 ST. • WICKLIFFE, OHIO

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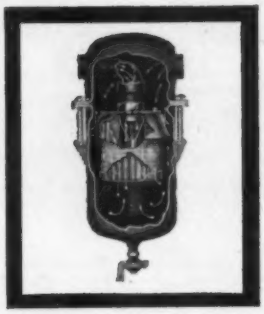
KEEP IT CLEAN

by Phil Tration

As a batter, Bill couldn't hit beans;
Got dust in his eyes, it seems.
Someone whispered the clue—"Use a Filter, Staynew,"
Now, he hits the ball like a fiend.



Let's see how your batting eye is. Take a look at the advantages of Dollinger Staynew Filters—they do a top job of cleaning, they're easy to maintain, and they're available for whatever degree filtration you need. Don't get caught in a squeeze play; call in your Dollinger sales engineer today. He'll show you how to stay away from those "foul" lines—foul air, liquid, or gas lines, that is.

STAYNEW MODEL CPHS PIPE LINE FILTER has the exclusive "double action principle." Air is first deflected to outer walls of Filters and forced downward at high speed. Water, oil, and heavier particles of rust, etc. are thus deposited in base. Mechanically cleaned air then rises to pass through filtering medium which removes lighter airborne particles. This "double action" design eliminates need for frequent cleaning.

Inexpensive, simple to install, Dollinger Pipe Line Filters pay for themselves in reduced maintenance alone. Why not talk over your filtration problems with a Dollinger engineer . . . or write for Bulletin 200 which gives engineering data on pipe line filters. Dollinger Corporation, 55 Centre Park, Rochester 3, N. Y.

USE PROTECTOMOTOR U.S. PAT. OFF.

STAYNEW FILTERS

DOLLINGER

SPECIALIZING IN DRY TYPE FILTERS FOR OVER 35 YEARS

LIQUID FILTERS • PIPE LINE FILTERS • INTAKE FILTERS • HYDRAULIC FILTERS • ELECTROSTATIC FILTERS • MIST COLLECTORS • DRY PANEL FILTERS • SPECIAL DESIGN FILTERS • VISCOUS PANEL FILTERS • LOW PRESSURE FILTERS HIGH PRESSURE FILTERS • AUTOMATIC VENTILATION FILTERS • NATURAL GAS FILTERS • SILENCER FILTERS

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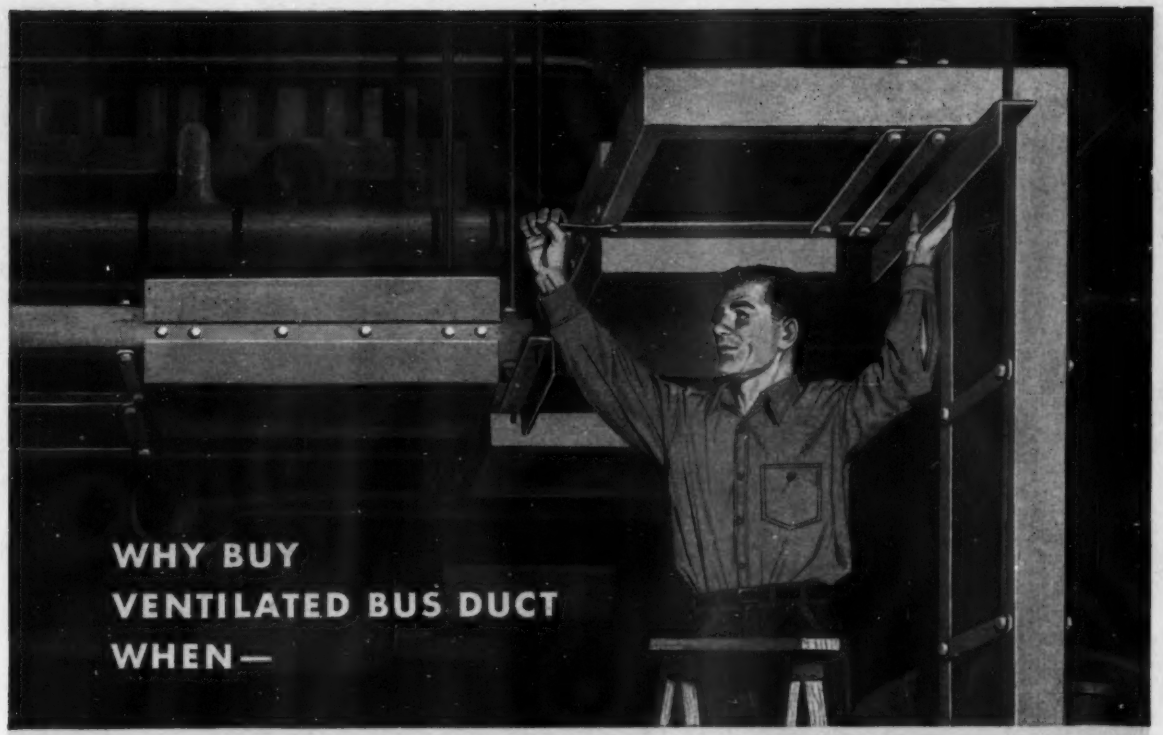
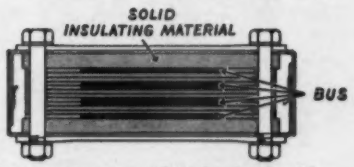


Square D TOTALLY ENCLOSED Duct*
mounts in any position without de-rating
—*and costs no more*

*(low impedance)

Square D totally enclosed low-impedance bus duct mounts in any position without de-rating, because it doesn't need ventilation. Moreover, you can have all the advantages of totally enclosed duct without the price penalty of a "special," because all Square D low-impedance bus duct is totally enclosed. Square D feed-in duct has no ventilation holes, is protected from physical damage and dust accumulation. It's smaller than ventilated duct by as much as 50%. Doesn't it make sense, when buying low-impedance duct, to specify a product that meets every one of your requirements? Square D totally enclosed low-impedance duct costs no more —why settle for less?

Here's Why Square D's EXCLUSIVE Design makes ventilation unnecessary



The entire space within the duct and between the bus bars is filled with a solid insulating material which conducts the heat to the surface. There are no dead air spaces inside the duct. Square D totally enclosed low-impedance duct is listed with Underwriters' Laboratories and meets U/L requirements for temperature rise in any mounting position.

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT ... NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

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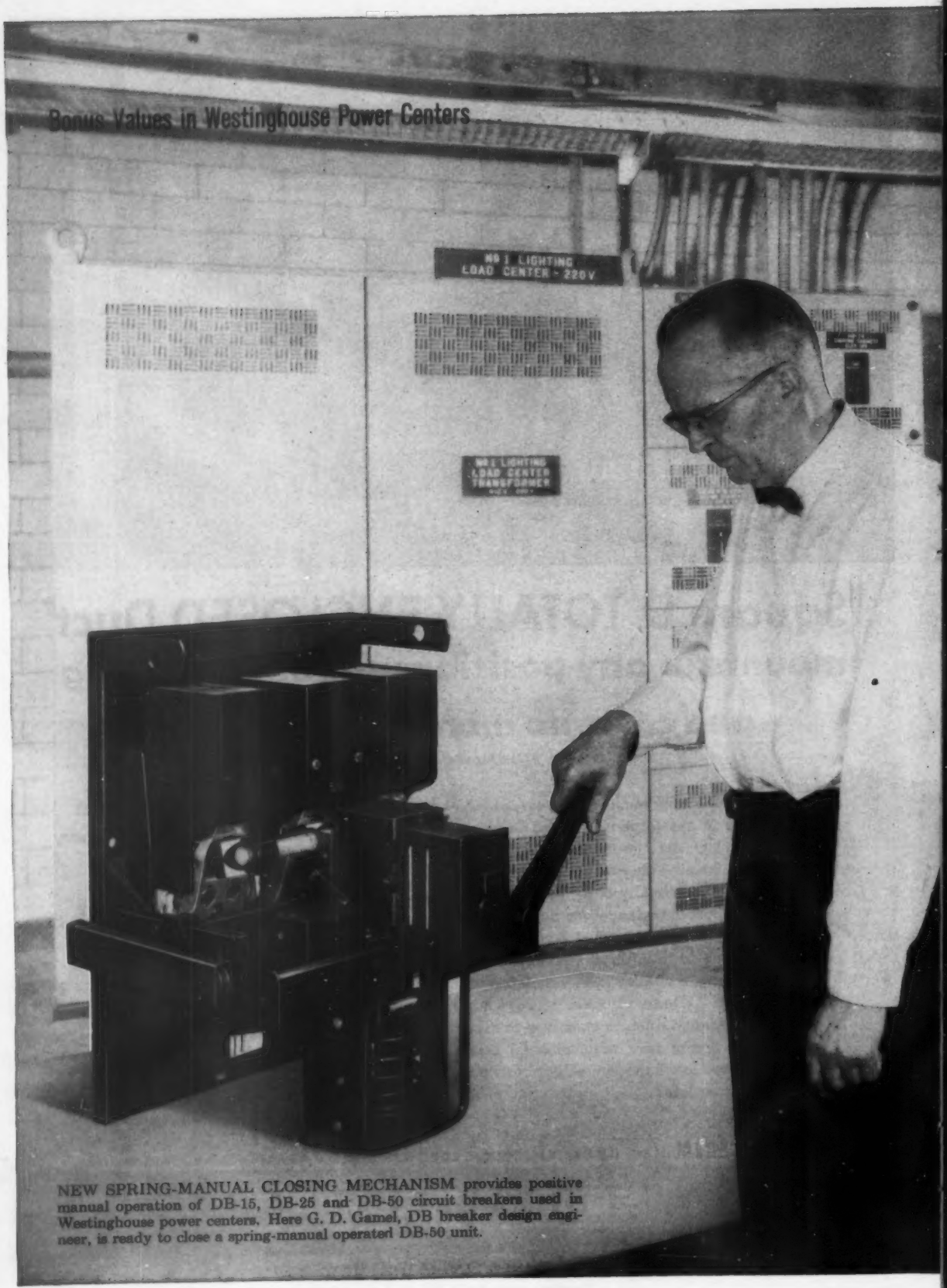


NEW SPRING-MANUAL CLOSING MECHANISM provides positive manual operation of DB-15, DB-25 and DB-50 circuit breakers used in Westinghouse power centers. Here G. D. Gamel, DB breaker design engineer, is ready to close a spring-manual operated DB-50 unit.

Westinghouse power centers offer greatest component selection... plus new switchgear insulation

You Can Choose the Breaker Operation You Need. Low-voltage air circuit breakers (DB-15, DB-25 and DB-50) provided in Westinghouse power centers are now available with a choice of manual, spring-manual or electric closing mechanisms. In accordance with industry standards, DB-75 and DB-100 breakers are available with an electrically operated closing mechanism only.

You Can Choose the Transformer You Need. As with breaker closing mechanisms above, Westinghouse gives you complete freedom of choice in selecting the power center transformer best suited to your application. Within code limitations, you can choose *oil-filled* for outdoor service . . . *Inerteen®-filled* for outdoor or indoor service where a nonflammable, liquid-cooled transformer is desirable . . . *ventilated dry-type* for maximum safety and minimum maintenance under controlled atmospheric conditions, indoors . . . and *sealed dry-type* for complete safety and virtually no maintenance, under adverse atmospheric conditions, indoors or outdoors.

New Westinghouse Insulation of improved glass polyester material is used for bus supports and short circuit bracing in Westinghouse low-voltage metal-enclosed switchgear. In addition to being highly track resistant, this new insulation is also flame retardant, and the design of supports and bracing provides increased vertical creepage distances. Result is maximum safety with minimum maintenance.

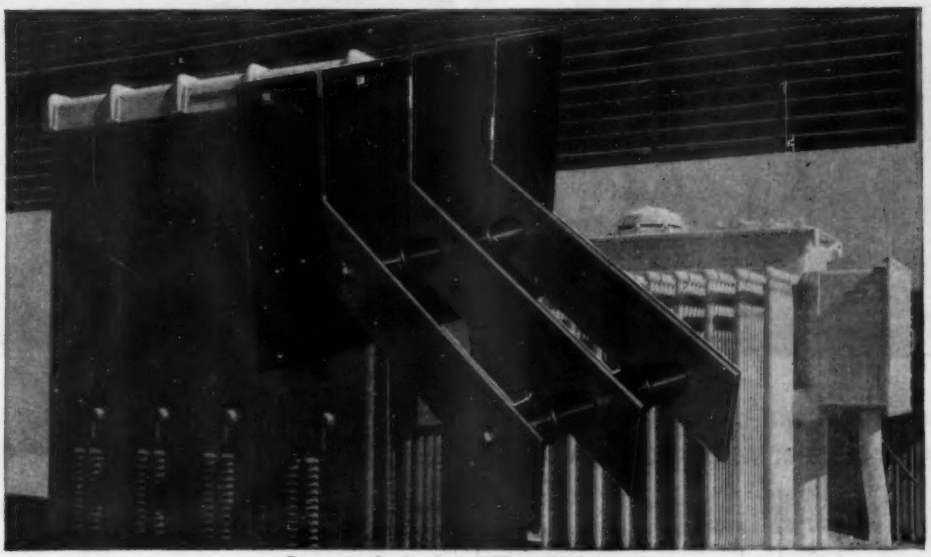
These features are only a few of the continuing product improvements that provide true bonus values beyond specification in Westinghouse power centers. For complete details, call your Westinghouse representative—or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

J-60979

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS

NEW WESTINGHOUSE GLASS POLYESTER INSULATION is used for bus supports and bracing in low-voltage metal-enclosed switchgear of Westinghouse power centers.



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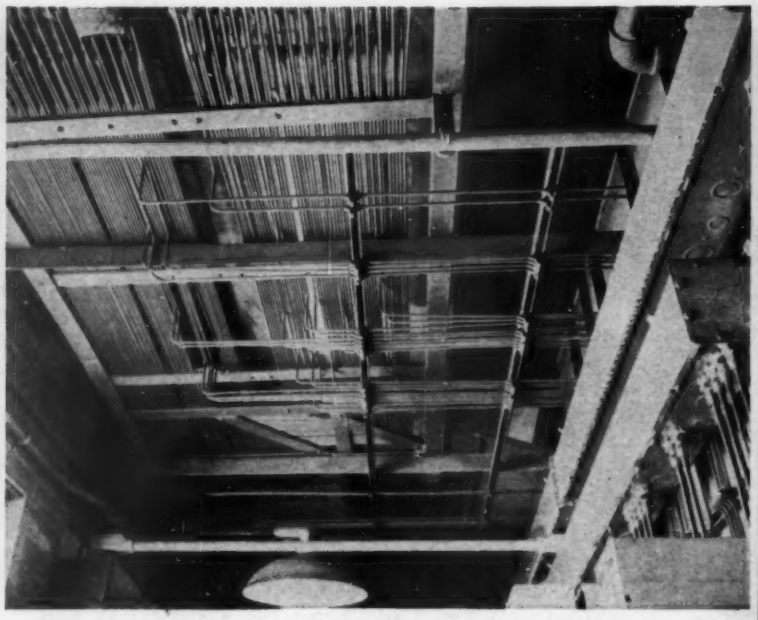
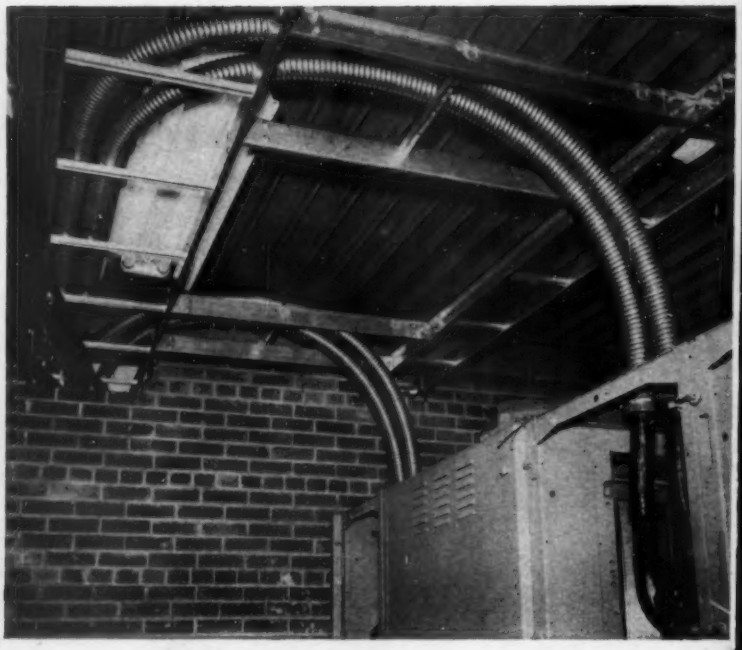


the right combination for



ONLY GENERAL CABLE MANUFACTURES BOTH TYPE MI AND INTERLOCKING ARMORED CABLES. CONTACT YOUR NEAREST GENERAL CABLE SALES OFFICE FOR FULL INFORMATION AND SPECIFICATIONS.

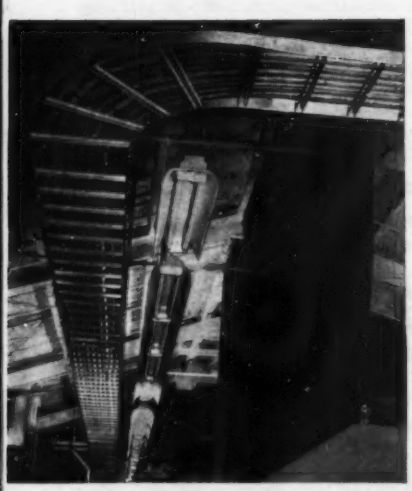
type mi cable

for power distribution, control and lighting circuits

TYPE MI CABLE has solid copper conductors and sheath separated by highly compressed inorganic insulation! Just about indestructible, yet it trains easily over and around obstructions. Naturally it needs no protection: just train it and terminate it. MI is compatible with all other wiring systems. It is completely resistant to moisture, age, nearly all chemicals, temperatures up to 185°F with standard terminations, 482°F with special terminations; and it is approved for use in hazardous areas. It will last forever.

industrial power

Type MI Cable and Interlocking Armored Cable work together to lower installation costs, minimize space requirements, provide maximum flexibility and accessibility in your cable systems.



inter-locking armored cable

for feeder circuits

GENERAL CABLE'S Interlocking Armored Cable combines flexibility with the mechanical protection normally afforded by metallic conduit, yet has the same current rating as cable in free air. It can be trained to fit the contours of buildings and surrounding equipment and provides a neat, compact installation. It is available in bronze, aluminum and steel and may be applied over most cable insulations in the voltage ranges recommended by industry standards. Protective coverings are available to combat environmental conditions which might cause pitting or corrosion of the interlocking armor.

GENERAL CABLE CORPORATION
65 Offices and Distributing Centers Coast-to-Coast

730 Third Avenue
New York 17, N. Y.

for quality and service specify... **GENERAL CABLE**

For more facts circle 578 on Reply Card

You can't "breathe new life" into old unit heaters...

don't repair.....

1 Every heating season, thousands of old steam unit heaters develop leaks. And when a unit starts to leak it's almost a sure sign useful life is just about over. Repairs are usually a waste of time and money . . . it's economically wiser to replace.

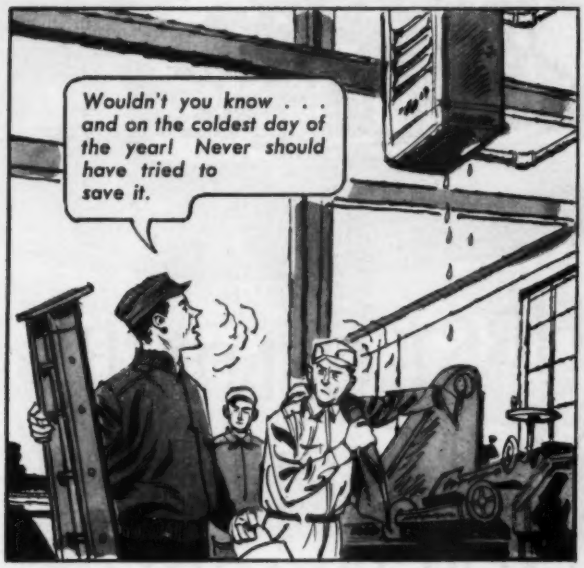
2 In *time* alone, it costs from $25 to $300 (if scaffolding is required) to disconnect, take down and reinstall an "old-age" unit. Add the actual repairs — and the final cost is prohibitive. What's more, chances are additional leaks will soon crop up.

3 Unit heater failure is generally caused by internal or external corrosion. Sometimes it's due to improper venting or trapping. But even with careful maintenance, units eventually begin to show signs of wear, lose efficiency, develop leaks.

4 Because it's impossible to inspect the extent of corrosion within heating coil tubes, no one can predict where or when the next leak will occur. Repairs only prolong the unit's life for a *completely unpredictable* length of time.

In Canada: Sarco Canada, Ltd., Toronto 8, Ontario

. replace with Modine



5 Service records show that most unit heater failures occur during coldest weather . . . often interrupt production at critical times. With a well-planned replacement program, failures are anticipated . . . units can be replaced in summer and early fall.

6 By replacing your old units with new Modines, you eliminate the danger of shutdowns and the expense of frequent (often useless) repairs. And you'll find that new Modines heat better, use less fuel, run quieter and require only routine maintenance.

Get your Modines from local distributor stocks

POWER-THROW® . . . 10 SIZES

HORIZONTAL . . . 24 SIZES

VERTICAL . . . 28 SIZES

PROPELLER-TYPE GAS-FIRED . . . 8 SIZES

You'll find just what you need in Modine's unit heating equipment line. It's the world's broadest . . . with types, models and sizes to match any temperature, air delivery and location requirement. Most important, *all* Modines have these benefits in common: superb styling, long-life, economical installation and operation, just-right heating performance.

Find out how you can save by replacing your unit heaters with new Modines . . . either steam and hot water or gas-fired. Mail the coupon for full information.

COMPLETE REPLACEMENT PROGRAM DATA !

See your Modine distributor or use this coupon to get (1) full information on replacement program, (2) 22″ x 24″ wall chart containing unit heater maintenance tips and a valuable performance check list, (3) Modine's "Repair or Replace?" bulletin, (4) Gas Unit Heater Installation Guide.

Modine
MANUFACTURING COMPANY

MODINE MANUFACTURING CO.
1563 DeKoven Ave., Racine, Wisconsin

Send replacement program data ☐; wall chart and "Repair or Replace?" bulletin ☐; Gas Unit Heater Installation Guide ☐.

Name .....

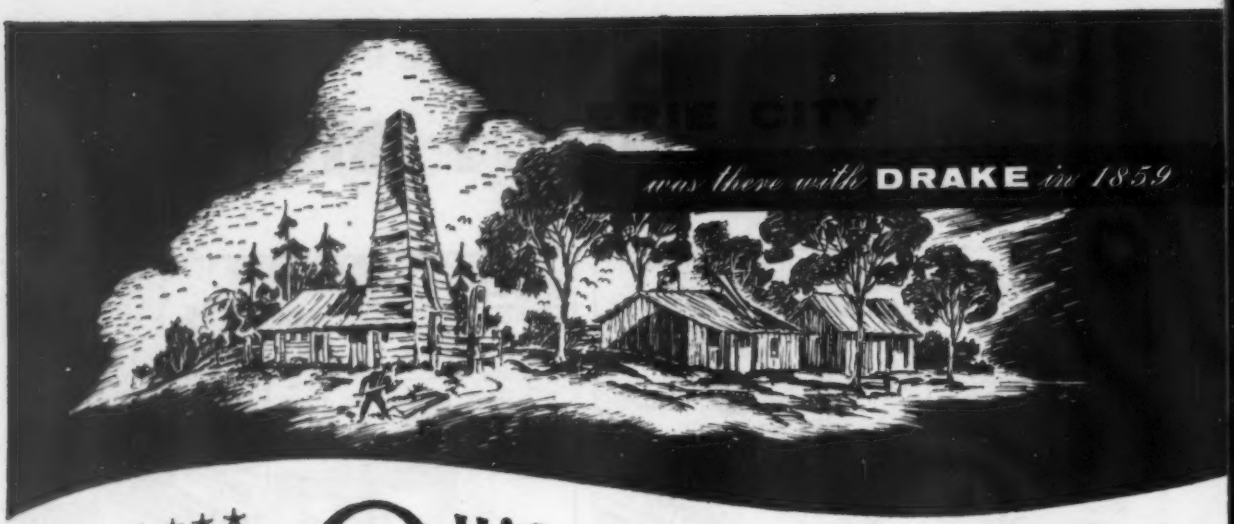
Firm .....

Address .....

.....

SU-1398

For more facts circle 579 on Reply Card



OIL'S FIRST CENTURY ~BORN IN FREEDOM WORKING FOR PROGRESS

IN the beginning there was a dreamer and a dream. The dreamer was Col. Edwin L. Drake - - - his dream was to drill the first oil well in the history of the world so the collection of oil could be simplified. To accomplish this end he needed a small boiler and a steam engine. These first pieces of steam power equipment were supplied to Col. Drake by a then relatively small progressive foundry and machine shop - - - Erie City Iron Works.

ERIE CITY Since 1840

★ OVER A CENTURY IN STEAM GENERATION WORKING FOR PETROLEUM

Now 100 years later the needs and the requirements of the giant oil industry are not quite so simple nor so easily solved. Numerous installations of large packaged and field assembled steam generators are required to produce the millions of pounds of steam used daily by the oil and petrochemical industries.

Erie City has kept constant pace with these industries. At first with small, low pressure boilers and presently with large capacity, high pressure, highly efficient, modern steam generators. Oil producing and processing plants all over are using Erie City boilers and allied steam generating equipment in their effort to satisfy our nation's basic needs.

A new general catalog describing all of Erie City's products is available. Write for Bulletin SB-6093-K.

You can depend on ERIE CITY for Sound Engineering

ERIE CITY IRON WORKS • Erie, Pa.

STEAM GENERATORS • SUPERHEATERS • ECONOMIZERS • AIR PREHEATERS
WASTE HEAT BOILERS • FIRE AND WATER TUBE PACKAGE BOILERS
OIL AND GAS BURNERS • STOKERS • PULVERIZERS

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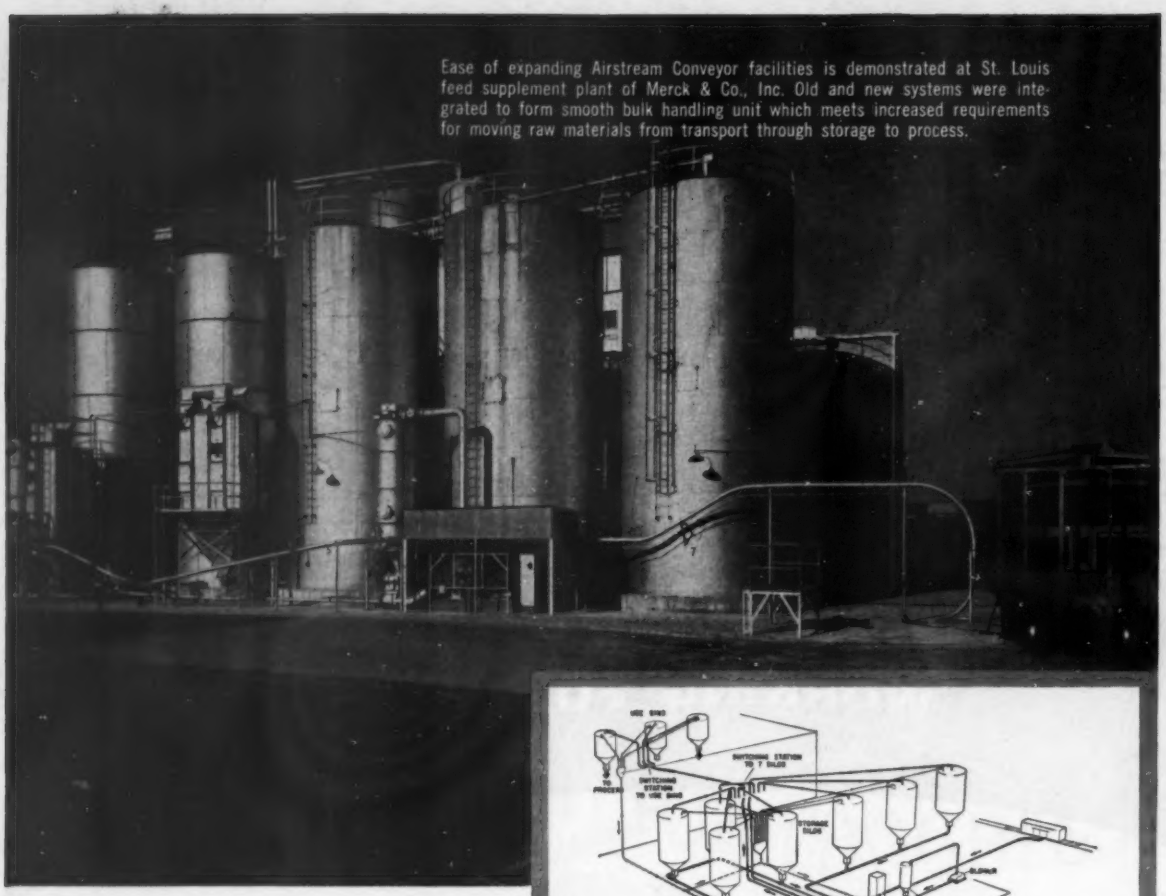
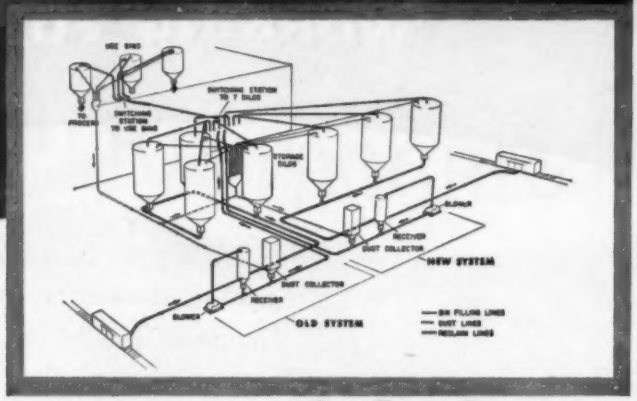


Ease of expanding Airstream Conveyor facilities is demonstrated at St. Louis feed supplement plant of Merck & Co., Inc. Old and new systems were integrated to form smooth bulk handling unit which meets increased requirements for moving raw materials from transport through storage to process.



AIRSTREAM CONVEYORS ARE . . .

easily expansible

If you plan to grow, here's a thrifty way to avoid future bulk handling problems: install a Dracco Airstream Conveyor System to meet *current* needs, expand it when and as required.

You can easily tie a new system in with the original installation. New storage facilities can be built where you want them, without regard to location of existing receiving areas. Airstream conveying lines carry your dry bulk material to its destination via the quickest route—horizontally, vertically, through walls and floors, underground or overhead. They fit any plant layout, new or old, and save you valuable space. Ground level or rooftop installation eliminates costly supporting structures.

Merck & Co. recently took advantage of these features when they expanded their ground level Airstream System. In addition, use of duplicate components in the new system cut engineering costs. This also simplifies maintenance and permits minimum parts inventory.

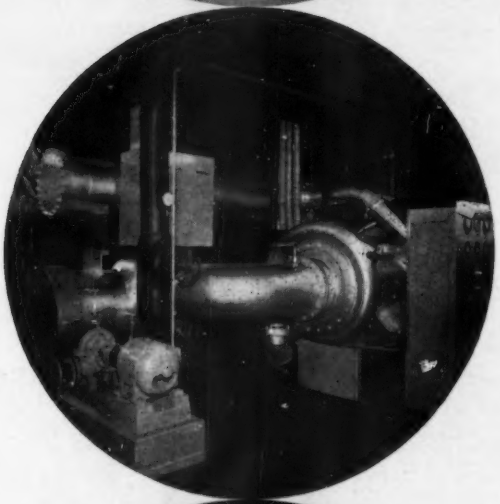
Benefits like these tell you why it's smart to install a bulk handling system that is engineered to help you move ahead. Call or write Dracco now for detailed information.

DRACCO DIVISION OF FULLER CO.
4035 East 116th Street • Cleveland 5, Ohio

DRACCO *airstream* conveyors
dust control equipment

(Pronounced Dray'co)

For more facts circle 581 on Reply Card



New annex to Indiana National Bank, Indianapolis (Top Illustration)
Architect: D. A. Bohlen & Son. *Consulting Engineer:* Bevington, Taggert and Fowler. *Mechanical Contractor:* R. M. Cotton Company.

Climate by Chrysler

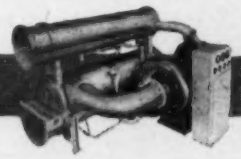
. . . cuts the cost of cooling two buildings for Indiana National Bank

The new 9-story addition to Indiana National Bank in Indianapolis is adjacent to an older 9-story bank annex which was already air conditioned. When the consulting engineers planned the cooling system for the new building, they came up with a unique way to cool *both* buildings with a Chrysler Centrifugal Liquid Chiller in the new addition as the basic unit . . . and bring the bank considerable savings in operating costs.

The new 218-ton Chrysler Chiller was also connected to the air handling equipment in the old annex. Thus, the new, extra-efficient unit operates under most economical conditions whenever air conditioning is needed in either building. The two units in the old annex are used only when additional capacity is simultaneously needed for both buildings.

What gives the Chrysler Centrifugal Chiller its extra efficiency? The exclusive true volute casing design is the answer. It delivers more tons of air conditioning per motor horsepower. (Or, if you wish, you can get a given tonnage with a smaller, less expensive motor—and save money on initial cost and operating expense.)

No matter how large or complicated your air conditioning job, Climate by Chrysler can be custom-engineered to save you money. For complete information, have your consulting engineer contact the local Chrysler Applied Machinery and Systems sales office.



CHRYSLER
AIRTEMP

Airtemp Division, Chrysler Corporation, Dept. V-109, Dayton 1, Ohio
In Canada: Therm-O-Rite Products, Ltd., Toronto, Ontario

For more facts circle 582 on Reply Card

LOOK FIRST TO **POWELL**

Features of Construction:

Powell Corrosion Resistant Valves are made in stainless steel, Monel, nickel, Hastelloy alloys, aluminum and other special corrosion resisting metals.

Solid and double wedge discs of gate valves are interchangeable. They are precision machined and fitted and are accurately guided throughout their entire travel. This prevents drag of the disc over the seat faces, eliminating wear of seating surfaces and stops undue vibrational noises.

O.S.&Y. Valves—Stems are threaded and guided through a bronze bushing in upper yoke. (Bushings made of other alloys can be supplied on special order.) A compression lubricant fitting in upper yoke is provided to lubricate the stem and bushing threads and to reduce wear. A convenient shelf is cast on the inner sides of yoke arms for suspending the gland when renewing the packing.

All valves are regularly packed with Teflon Packing. Globe and "Y" valves are available with metal or Teflon discs.

Globe, Angle, Gate and "Y" valve stems are back seated for repacking under pressure when fully open.

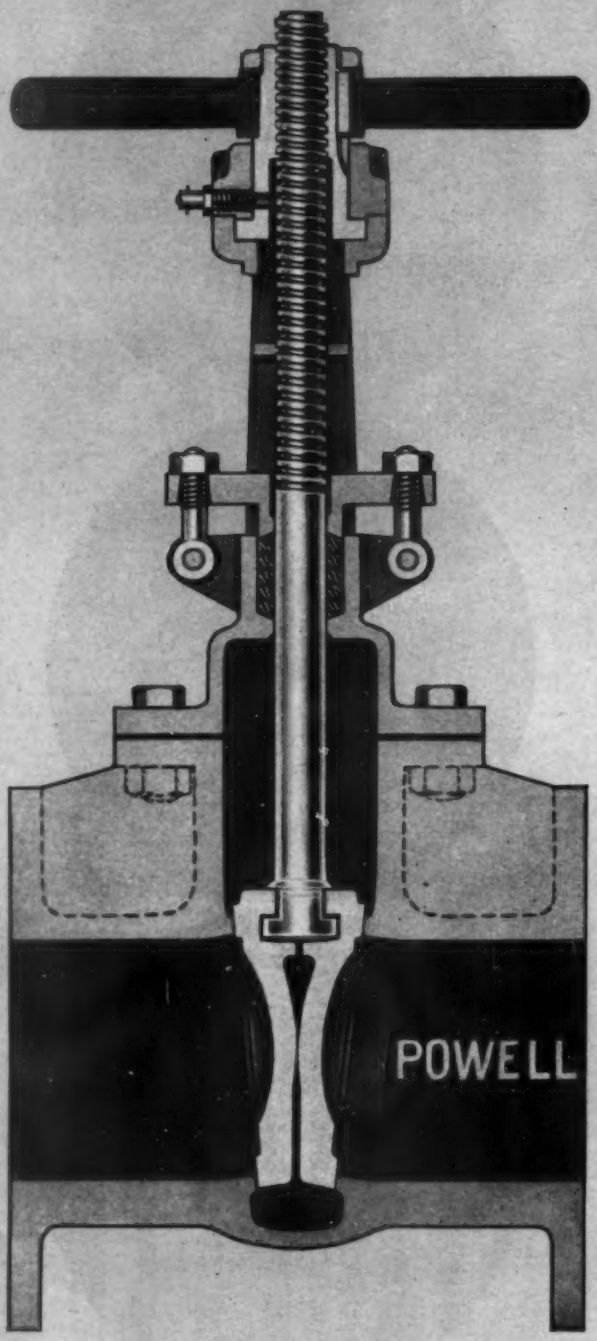


Fig. 2453 DG (Sectional)—Large Stainless Steel O.S.&Y. Gate Valve. Available with interchangeable solid or split wedges. Wedges are fully guided throughout their travel.

POWELL...world's largest family of valves

FOR CORROSION RESISTANT VALVES

Over a quarter century ago, Powell introduced the Corrosion Resistant Valve. Now, after years of pains-taking experiments and exhaustive research, Powell offers Valves to handle practically every corrosive fluid—valves of every design, and in the largest possible selection of metals and alloys.

For all your flow control requirements—water, oil, gas, air, steam, as well as corrosive fluids—Powell has the right valve in the right size and the right metal. Consult your local Powell distributor or write directly to us.

Fig. 2633—Large, Stainless Steel Swing Check Valve for 150 W.P. Sizes, 2" to 12".

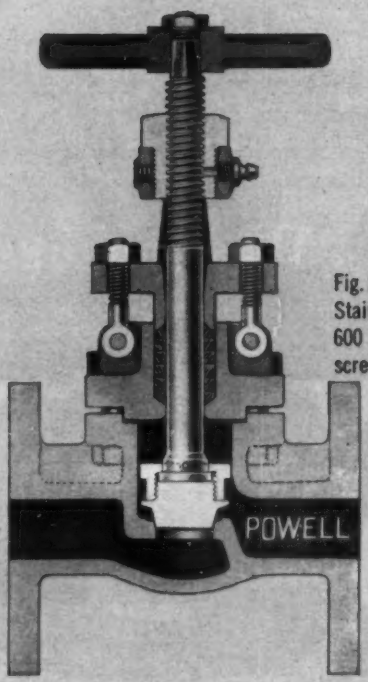
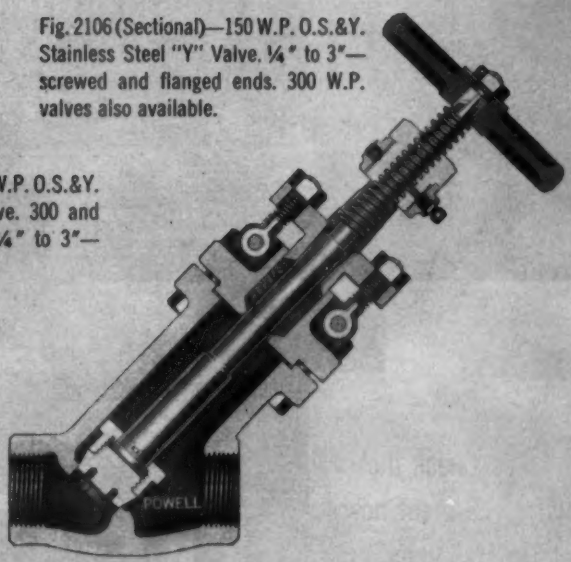


Fig. 2475 (Sectional)—150 W.P. O.S.&Y. Stainless Steel Globe Valve. 300 and 600 W.P. also available. ¼" to 3"—screwed and flanged ends.

Fig. 2106 (Sectional)—150 W.P. O.S.&Y. Stainless Steel "Y" Valve. ¼" to 3"—screwed and flanged ends. 300 W.P. valves also available.



THE WM. POWELL COMPANY • *Dependable Valves Since 1846* • **Cincinnati 22, Ohio**

For more facts circle 583 on Reply Card

Westinghouse develops new motor starters with 6 "monkey proof" safety features

Westinghouse NEMA 12 Life-Line® combination starters end unauthorized tampering, offer greater safety and convenience to service personnel

To order simply contact your local Westinghouse representative or distributor now, or write Westinghouse Electric Corporation, Standard Control Division, Beaver, Pa.

YOU CAN BE SURE... IF IT'S **Westinghouse**

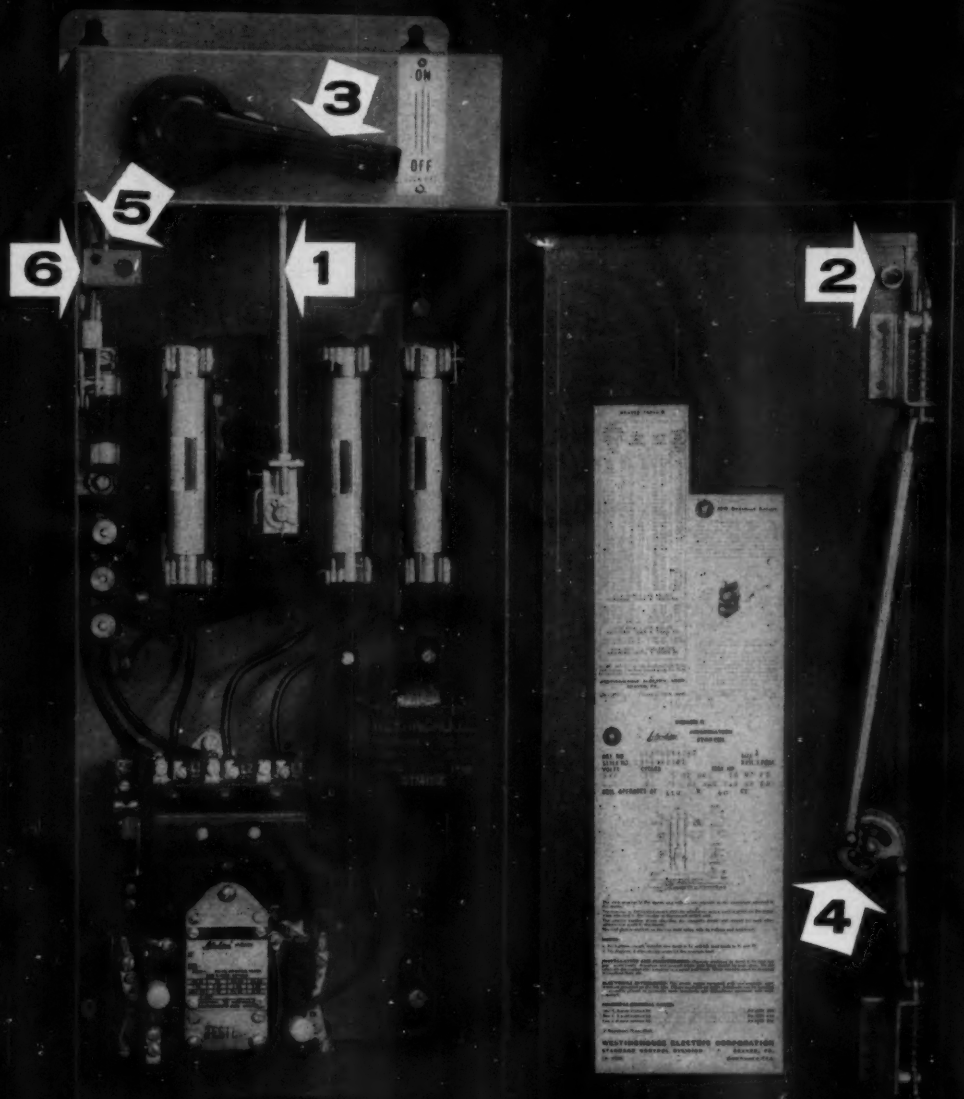
Watch "Westinghouse Lucille Ball Desi Arnaz Shows" CBS TV Fridays

Check these 6 great new safety "firsts"... 1 2 3

SAFE—You always know whether power is on or off because ON-OFF handle is permanently attached to disconnect... even when door is open.

SAFE—Positive gasket seal keeps out oil and dust. An interlock requires that door must be tightly sealed before handle can be moved to ON position.

SAFE—Even when you're out of sight, padlocking ON-OFF handle prevents any operation of disconnect regardless of whether door is *OPEN* or *CLOSED*.



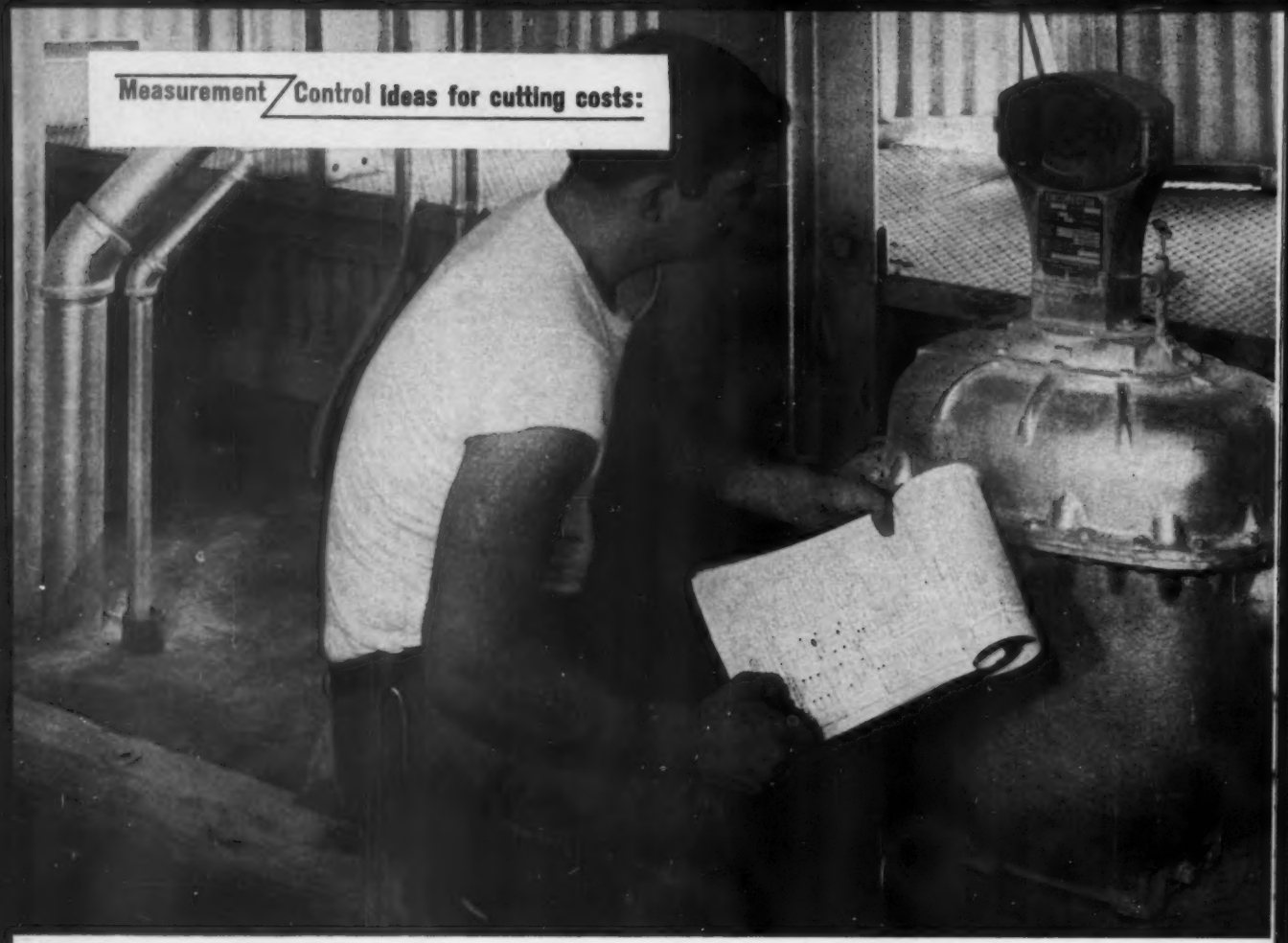
456

SAFE—Discourages tampering by unauthorized personnel. Tool required to open door.

SAFE—Accidental operation of disconnect impossible when door is open. Disconnect interlock must be deliberately voided to operate ON-OFF handle.

SAFE—Interlock prevents door from being opened when switch is on. ON-OFF handle must be in OFF position to open door.

J-30306



Couldn't "in-plant metering" HELP YOU CUT COSTS TOO?

Wherever things flow through pipe in your plant—whether as fuel, aids to production, or finished products—chances are that in-plant metering will be an immediately profitable investment. For example: above, you see Rockwell gas meters installed on individual enameling furnaces. The meters were recommended by a Rockwell field engineer as a fast, easy way of spotting furnace inefficiencies and preventing fuel wastage. Also, accurate fuel cost records of each operation were available for the first time—Cost Accounting Department figures were made more revealing.

In a bottling plant, another Rockwell field engineer recommended water meters to prove amounts of water actually bottled with product. The result: a sizable reduction in a sewage tax based on the premise that all water going into the plant would be discharged into the sewage system.

These are just a few examples of the many ways Rockwell field engineers are helping save time, money and material in a wide variety of manufacturing and process plants. These field men represent Rockwell's experience as the world's largest manufacturer of measurement and control products. Why not have a Rockwell field engineer visit your plant to explore new approaches to cost cutting through improved measurement and control? Send the coupon—there is no obligation.

ROCKWELL

The leading single source for Measurement / Control products and ideas

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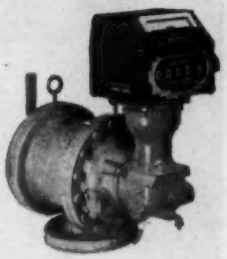
"IN-PLANT" METERING:

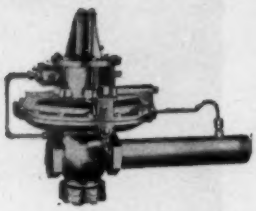
LIQUIDS AND GASES

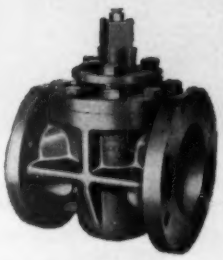


"IN-PLANT" METERING can mean new cost cutting opportunities. Accurate liquid and gas meters are a positive way of improving cost control, insuring better use of materials, sharpening inventory control, and preventing waste. Whatever the need, Rockwell has the right liquid or gas meter to do the job better and at lower cost.

CONTROLLING PIPED MATERIAL:

LIQUIDS AND GASES





CONTROLLING PIPED MATERIAL more efficiently is a positive step towards cost cutting. Better valves can save wasted products and materials and often increase plant safety. Gas pressure regulators can cut costs by assuring safe, economical use of any gas used in the plant. Rockwell has the world's most complete line of flow control devices.

HOW MUCH COULD YOU SAVE?

There is hardly a plant of any kind—including yours—where the right application of the right measurement and control methods and equipment won't produce savings many times the modest cost involved. It will cost you nothing to have a Rockwell Field Engineer *show* you. Simply send the coupon below, now.

SEND COUPON NOW!

MEASUREMENT & CONTROL DEVICES

another fine product by

ROCKWELL

Rockwell Manufacturing Company, Pittsburgh 8, Pa. Dept. MC2K

☐ Please have a Rockwell Field Engineer call me for an appointment.

Please send literature on ☐ Controlling gas pressures; ☐ Valving gases, liquids and slurries; ☐ Measuring liquids; ☐ Measuring gases.

I am concerned primarily with ☐ Light & Heavy Metal Fabricating ☐ Basic Chemical Production ☐ Chemical Processing ☐ Food, Drugs & Tobacco ☐ General Manufacturing Operations ☐ Petroleum Processing

☐ Others: _____

Name: _____ Title: _____

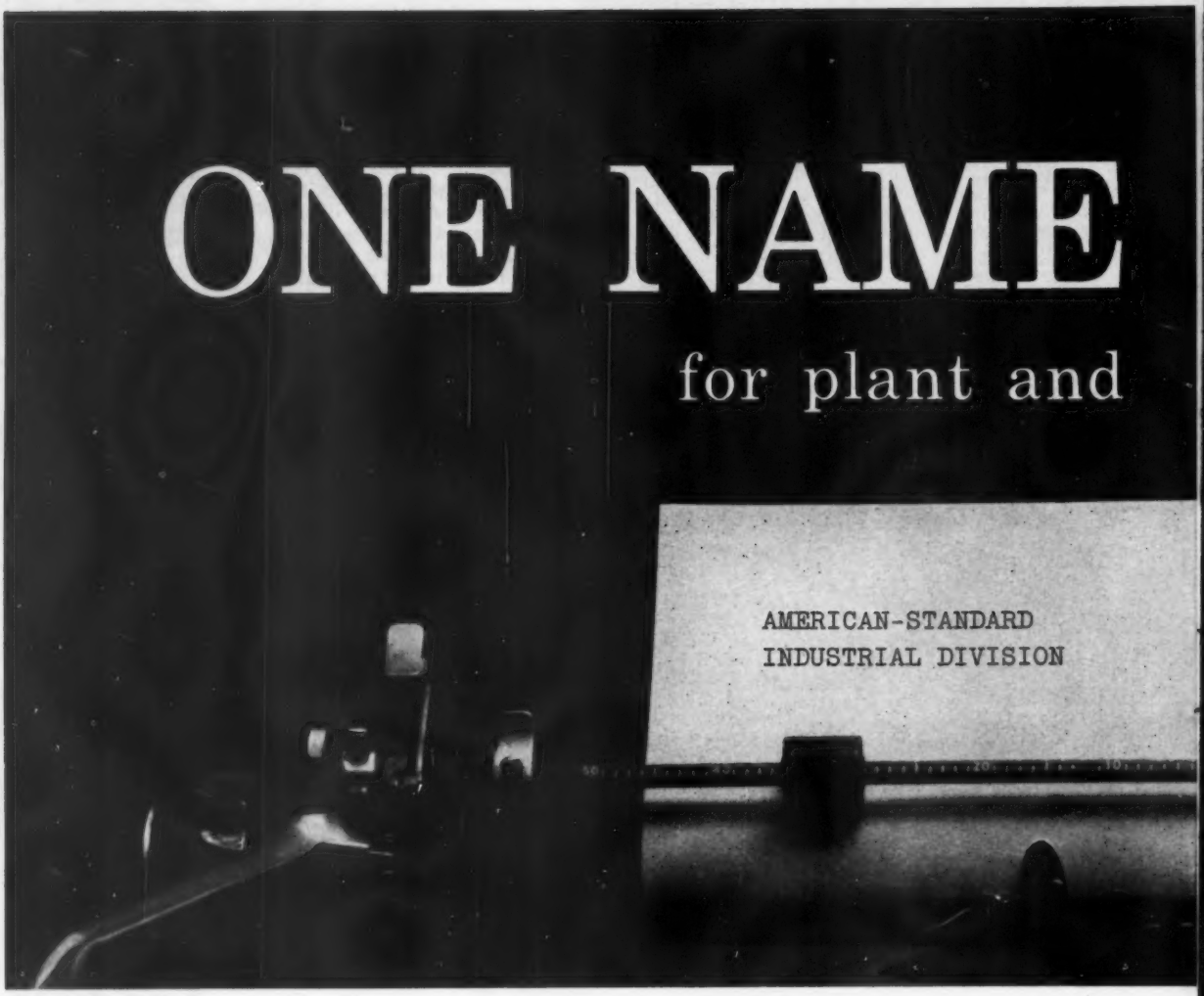
Company: _____

Address: _____

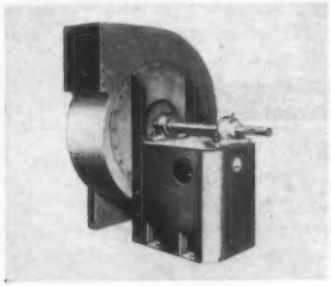
City: _____ Zone: _____ State: _____

ONE NAME

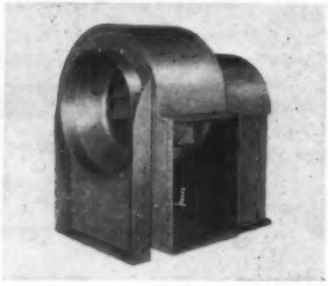
for plant and



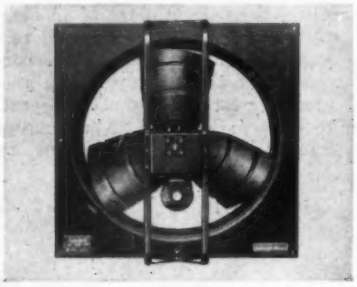
Industrial fans with wheel types for handling air, gases, materials, shavings.



Self-contained ventilating units for supply or exhaust in duct systems.



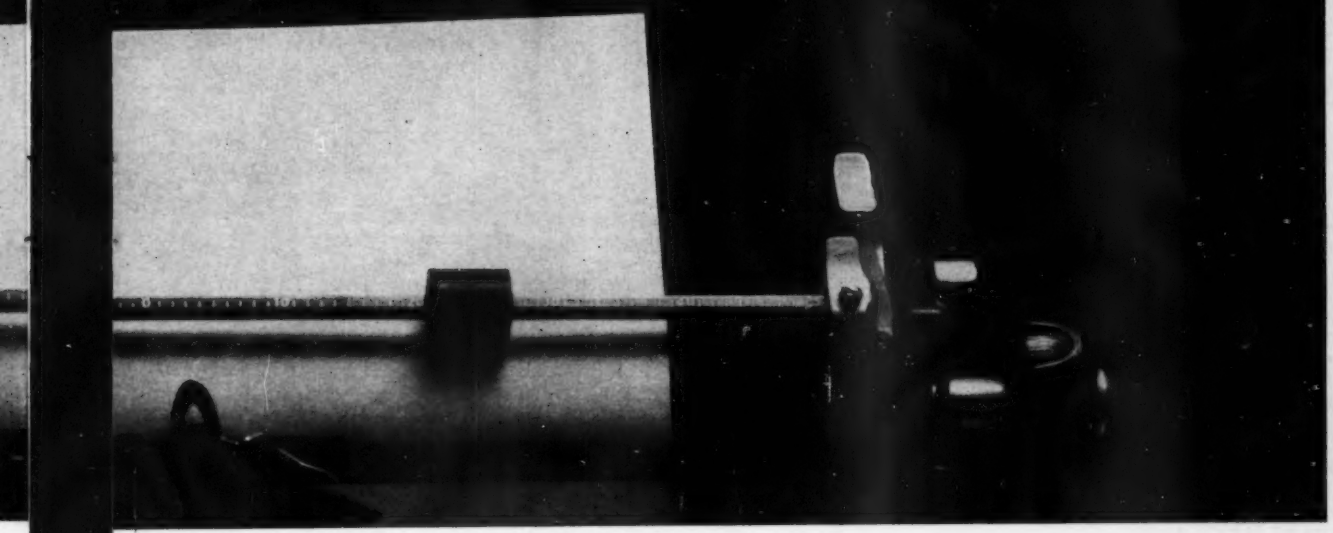
Ventura® fans for heavy-duty ventilating move smoke, fumes quickly and quietly.



One call for all

AIR-CONDITIONING EQUIPMENT: Refrigerating Machines • Water Chillers • Heating and Cooling Coils • Central-Station Air Conditioners Packaged Air Conditioners • Air Washers • **AIR-HANDLING EQUIPMENT:** Centrifugal, Propeller, and Axial Fans • Power Roof Ventilators Utility Sets • Specialized Fans and Blowers • **HEATING EQUIPMENT:** Firebox, Scotch-Type and Packaged Boilers • Steam, Hot-Water, and Gas-Fired Unit Heaters • Heating and Ventilating Units • Cabinet Heaters • **PROCESS EQUIPMENT:** Dust Collectors • Heat Exchangers Lube Oil and Jacket Water Coolers • Gyrol® Fluid Drives • Centrifugal Compressors • Mechanical Draft Fans • Surface Condensers

is all you need to know process air-handling equipment



American-Standard* Industrial Division is the name to know for air-moving equipment to handle *every* duty. For, American-Standard's complete line of precision-built equipment ranges all the way from propeller fans for spot ventilation to giant centrifugal compressors that supply vital high-pressure air in industrial processes.

The point is, American-Standard Industrial Division can supply all the components for an efficient plant and process air-handling system tailored to your needs. You deal with one organization. You get one-source responsibility for quality and performance in equipment designed, engineered, and manufactured to work together.

Get in touch with us. Offices in all principal cities are staffed by product specialists to assist with equipment selection and on-the-job problems. AMERICAN-STANDARD INDUSTRIAL DIVISION, DETROIT 32, MICHIGAN. IN CANADA: AMERICAN-STANDARD PRODUCTS (CANADA) LIMITED, TORONTO, ONTARIO.

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AMERICAN-Standard
INDUSTRIAL DIVISION

AMERICAN BLOWER PRODUCTS • ROSS PRODUCTS • KEWANEE PRODUCTS

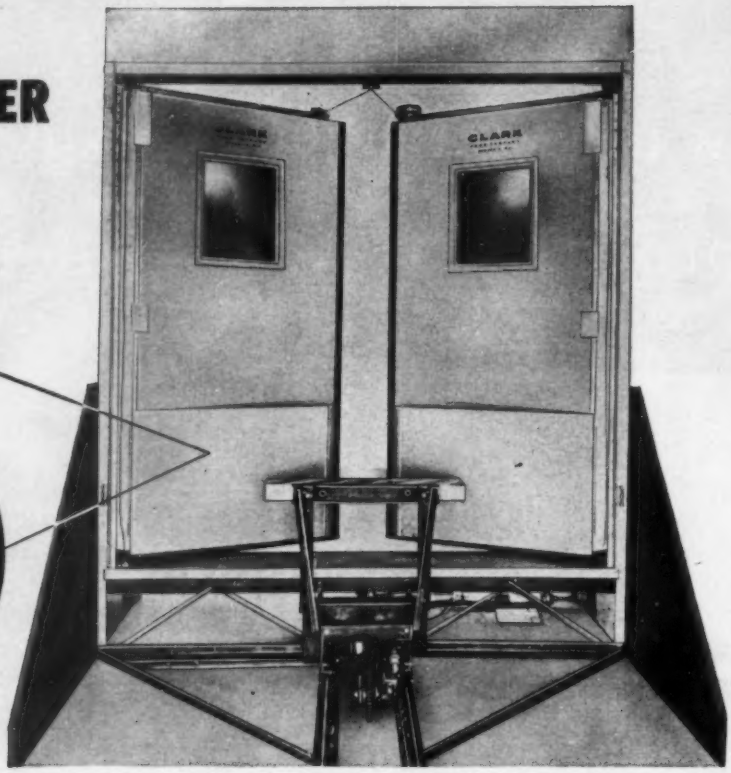
For more facts circle 586 on Reply Card

Takes Tough Treatment—

New CLARK

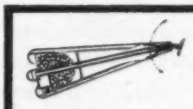
SHOCK ABSORBER DOOR

The BUMPER Takes the Shock . . . Not the DOOR



WON'T RIP, WARP OR COME OFF THE FASTENINGS

There was no mistaking the buzz of excitement that greeted the premier showing of the CLARK Shock Absorber Door. Visitors to the Materials Handling Show in Cleveland watched in open admiration as an air-powered ramrod pounded the door open with trip-hammer regularity.



EXCLUSIVE URETHANE-FILLED BUMPERS

20 times per minute, 6 hours per day for the duration of the Show, the door was banged open, returning every time to tight, accurate closure.

This graphic demonstration proves the Shock Absorber Door outlasts *any* contact door on the market without wear, tear or repair. Exclusive URETHANE-Filled Bumper takes the shock. Flexibly suspended hinges let the door "ride with the punch". Neoprene seals eliminate drafts. Spring Return is guaranteed.

If you want to keep traffic *moving*, write for the full story on this low-cost, easily installed door. Widths: 6′ - 8′. Heights: 7′ - 10′. Please specify size of opening.

CLARK DOOR COMPANY, INC.

(SINCE 1878)

507 Hunterdon St. 507 Newark 8, N. J.

For more facts circle 587 on Reply Card

Change hats
with your maintenance man . . .

You'll find out, with . . .

Vertical Lift Metal-clad you perform normal breaker maintenance in 20 minutes

Ask your maintenance man which make of metal-clad switchgear is easiest and quickest to maintain, and it's an odds-on bet he'll tell you General Electric Vertical Lift.

He can show you why. For example, one man, in just 35 seconds, can remove the box barrier to inspect the contacts. The arc chutes do not have to be removed. In fact, he can complete routine maintenance of an entire Vertical Lift breaker in 20 minutes or less. Saving his time saves you dollars. General Electric Company, Schenectady 5, New York. 511-34

Progress Is Our Most Important Product

GENERAL ELECTRIC

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Invincible draws used coolant from turret lathe into swivel-wheeled auxiliary tank. Especially designed for handling liquids in volume, tank is equipped with air diffuser, automatic shut-off and discharge valve.

INVINCIBLE VACUUM UNITS

Clean Machine Sumps Quick

Use Invincible vacuum equipment to remove the accumulated liquid, chips and dirt from machine coolant tanks and sumps. Eliminate mess—and do the job in ⅓rd the time.

At Great Lakes Manufacturing Corp., Cleveland, Ohio, the Invincible pictured services 17 major machines—turret lathes, grinders, and drill presses—plus a number of small machines.

All the maintenance man does is wheel the Invincible and auxiliary tank to each machine. He inserts the vacuum hose in the sump. Powerful vacuum draws out liquid, chips and sludge, depositing the mixture in the 55-gallon auxiliary tank. Average time per machine: 5 minutes instead of the 15 formerly required.

With Invincible, there's no need to remove highly inaccessible drain plugs . . . no need to handle messy drip pans (often 4 or 5 times per machine) . . . no need to hand-scoop slimy residue that remains after conventional draining.

And the Invincible also serves 2 to 3 hours a day as a vacuum cleaner, keeping shop, dock and office floors clean.

CHECK THE MANY USES FOR INVINCIBLES

Invincibles handle almost any material—liquid or granular—that will pass through a vacuum hose. They cost little, last for years. In 22 models from ½ to 7½ H.P.—the most complete line of heavy-duty industrial vacuum equipment. Resident engineers in all principal cities.

WRITE FOR BOOKLET . . . It tells about the many materials Invincibles reclaim or remove.

INVINCIBLE

VACUUM CLEANER MFG. CO.

DOVER, OHIO

OVER 50 YEARS THE LEADER IN INDUSTRIAL VACUUM EQUIPMENT

For more facts circle 589 on Reply Card

For more facts circle 590 on Reply Card →

ALUMALURE . . . at this price no building need be drab

Economy is no longer a reason to shun color for your buildings. Alumalure* comes in 11 exciting shades at a surprising 15 cents per square foot over plain aluminum. Nor do savings end with initial cost. The solid aluminum base metal defies corrosion, and the tough baked alkyd finish has already passed the 15-year mark in a rigorous test of durability.

Alumalure installs more easily than other materials, too, because it comes in longer and wider sheets. You have more colors to choose from, with a meticulous match from panel to panel.

Now write . . .

for the next best thing to an actual sample—our new color-swatch folder that shows exact shades plus data on sizes and finishes. Or, if you want to see the real thing, your local Alcoa salesman will bring over his full line of Alumalure samples today. Call him, or if you prefer, write on your company letterhead for the folder: Aluminum Company of America, 2066-J Alcoa Building, Pittsburgh 19, Pennsylvania.

ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA

Your Guide to the Best in Aluminum Value

Specify Alumalure!

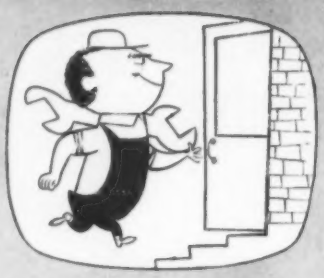
**Trademark of Aluminum Company of America*

For exciting drama watch "Alcoa Presents" every Tuesday, ABC-TV, and the Emmy Award winning "Alcoa Theatre" alternate Mondays, NBC-TV

4-Way® Safety Plate Presents

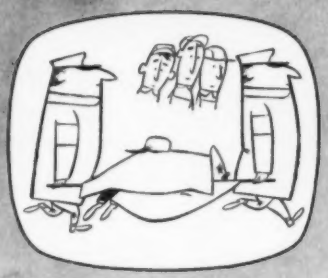
A GRIPPING TALE OF LIFE ON SKID ROW

THE BIG SLIP!

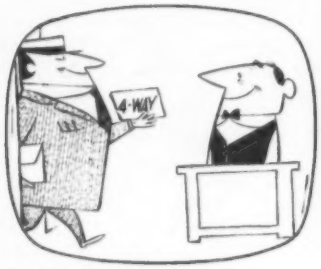


Enter our star—Benny Bandsaw. Great guy on the production line. Mr. America to his wife and kids. Every day Benny and millions just like him, go to work on Skid Row.

Watch it, Benny—look out! Wow! Too bad. On Skid Row, what *on the surface* appears to be a safe place to work, may turn out to be a surprise for Benny and his buddies.



And thus, another Skid Row tragedy. Our hero gets the slip and the result is *lost* time...*lost* production...*lost* safety records . . . and *lost* money.



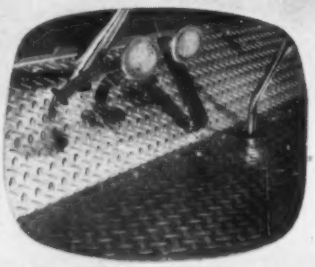
But...help is at hand. Enter 4-Way salesman...J. W. Goodheart...genial representative for versatile, slip-resistant 4-WAY Safety Plate!

Solution? Yes, Sir! Industrial plants, stores, offices, schools, hospitals, all over the USA, use 4-WAY . . . find it SAFE, STRONG, EASY TO CLEAN, ATTRACTIVE!

What's more, 4-WAY can be flame cut, sheared, sawed, drilled, punched, welded, formed . . . it is simple and EASY TO FABRICATE!

FIRESAFE, too! 4-WAY is an added safeguard for your people, your plant, your equipment and stock . . . and my how those insurance men appreciate it.

When it comes to installation and maintenance, no special tools or skill is required. Inland 4-WAY Safety Plate is one of the most ECONOMICAL materials you can use!



And don't overlook the advantages of super-strong, mighty-attractive, 4-WAY on the products you make. It can add an important merchandising feature that will help boost sales.

AMERICAN STEEL WAREHOUSE ASS'N

INLAND

4-WAY® SAFETY PLATE

Available at your Steel Service Center or from Inland in a wide variety of patterns and sizes.

INLAND STEEL COMPANY

30 West Monroe Street • Chicago 3, Illinois

For more facts circle 591 on Reply Card

New switch for matchless safety

Now, for the first time, the new American Electric Type "ND" Safety Switch offers *all* of the features "most wanted" in *one* safety switch by people who work with and use electrical equipment.

Included among the many "extras" to be found in this newest of safety switches are: visible double blade construction; positive, snap-action make and break; double insulation between blades and operating mechanism; optimum-size enclosures for maximum heat dissipation; plenty of wiring space for easier, faster installation; and an exclusive safety-yellow operating handle for quick, positive "spotting" even in poor light.

These and countless other field-tested design standouts assure the ultimate in safety switch protection with maximum operating life.

This new American Electric Normal Duty Safety Switch is, in fact, the result of the same kind of thorough engineering research and workmanship which has long made Clark Controller *"the standard of quality"* for industrial electrical control.

It meets NEMA standards for normal duty industrial and commercial use and is approved by Underwriters' Laboratories for these applications as well as for service entrance equipment. It is currently available in 30-ampere and 60-ampere, 250-volt and 600-volt ratings, both fusible and non-fusible.

Bulletin 250-ND fully describes every detail of this new switch designed for "matchless safety". For your free copy see your nearest American Electric Switch—Clark Controller Company distributor. Or, write direct. 9851

American
ELECTRIC SWITCH DIVISION

The **CLARK CONTROLLER** *Company*

Everything Under Control • 1146 East 152nd Street • Cleveland 10, Ohio

For more facts circle 592 on Reply Card

NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

Reader Service Cards on pages 287-288 make it easy to get further information on any of these products. Just circle the item numbers of the products you would like to know more about.

1—TINTING FORMULATION for existing window glass

This alkyd based formulation, a development of Du Pont and American Glass Tinting Corp., is introduced to permit flowing a transparent color coating directly onto window glass in position. It offers a means of controlling sun glare and heat at a cost reported considerably less than installation of factory tinted glass. The application method is fast and clean, company states; it doesn't interrupt normal plant operations, bonds tightly to window glass and may be washed without scratching, peeling or chipping. Eight colors are available. The finish is said to dry within 40 min to a coating much harder than provided by previously available materials. American Glass Tinting Corp.

2—TACHOMETERS also control associated circuitry

Electro Tach Model 7120 Series of transistorized tachometers have a dual function—measuring speed without physical loading, and control of associated circuitry, such as overspeed and underspeed control circuits. According to manufacturer, they provide speed control not previously available at comparable cost. A magnetic pickup is the sensing device. Angular

velocity of shaft projections or a rotating gear induce a signal in the pickup corresponding to frequency of revolution. The pickup's signal is converted by the tachometer to a direct current directly proportional to the frequency of the pickup's signal.

Instantaneous readings in addition to control circuitry are provided by a meter-relay unit whose scale is calibrated in rpm units. This meter has two pointers; one indicates rpm. The other, a control pointer, can be set prior to making a measurement to any value of rpm desired. Individual models in the series offer various control pointer arrangements. The adjustable control needle is available as a high-limit or low-limit contact. A combination of high- or low-limit contacts is also available. The tachometers operate on 117-v, a-c, 60 cycles. Electro Products Laboratories.

3—DUMPER handles modern bulk material containers

Hydro-Dumper is designed especially to handle recent type bulk material containers, such as the Pillar-Pac shown. Load capacity is up to 3 tons, and dumping heights up to 4 ft on

floor-level installation. Mobile units are mounted on four, ball bearing casters, the rear ones being swivel type for easier maneuvering. Two floor locks hold the dumper in position while loading or dumping. For permanent installation, the dumpers can be had without casters. They are hydraulically operated by lever or pushbuttons, can be loaded by hand or fork truck. Essex Conveyors, Inc.

4—FLOOR MAT cleans the shoes that walk on it

The Miracle Mat is designed to wipe shoes clean as it is walked upon. Installed in a doorway, it serves to keep the mud, slush and grime from being tracked in. The Miracle Mat is a heavy aluminum grille, rubber mounted within a welded steel frame installed in the floor. Brushes run the width of the grille just below the slats. Pressure of a footstep depresses the grille, actuating limit switches and an electric motor which puts the brushes in motion. The brushes sweep up through the grille openings—back and forth—and keep on scrubbing shoe soles and heels until the pedestrian steps off the mat.

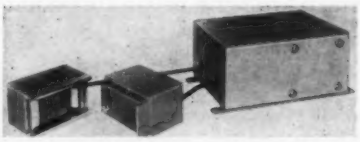
This mat, complete with grille, ¼-hp, 110-v, 60-cycle motor, and catch pan for dirt, lowers into an opening made in the floor. Dirt may be carried away through dust collection system or flushed into building drains. Mats come in three sizes for industrial use, brushes are offered in several types of materials. Progressive Engineering Co.

5—MAGNETIC PULLEY is permanent, ceramic type

Perma-Pulley incorporates a powerful ceramic magnet material, Ceramox V, to promote fast and continuous separation of tramp iron from deep burdens. Of radial pole, permanent type, this pulley is said to provide high magnetic strength across the entire width of conveyor belts and optimum removal efficiency at high operating speeds. Stainless steel construction is used for all-weather service. Easy installation is also announced. Dings Magnetic Separator Co.

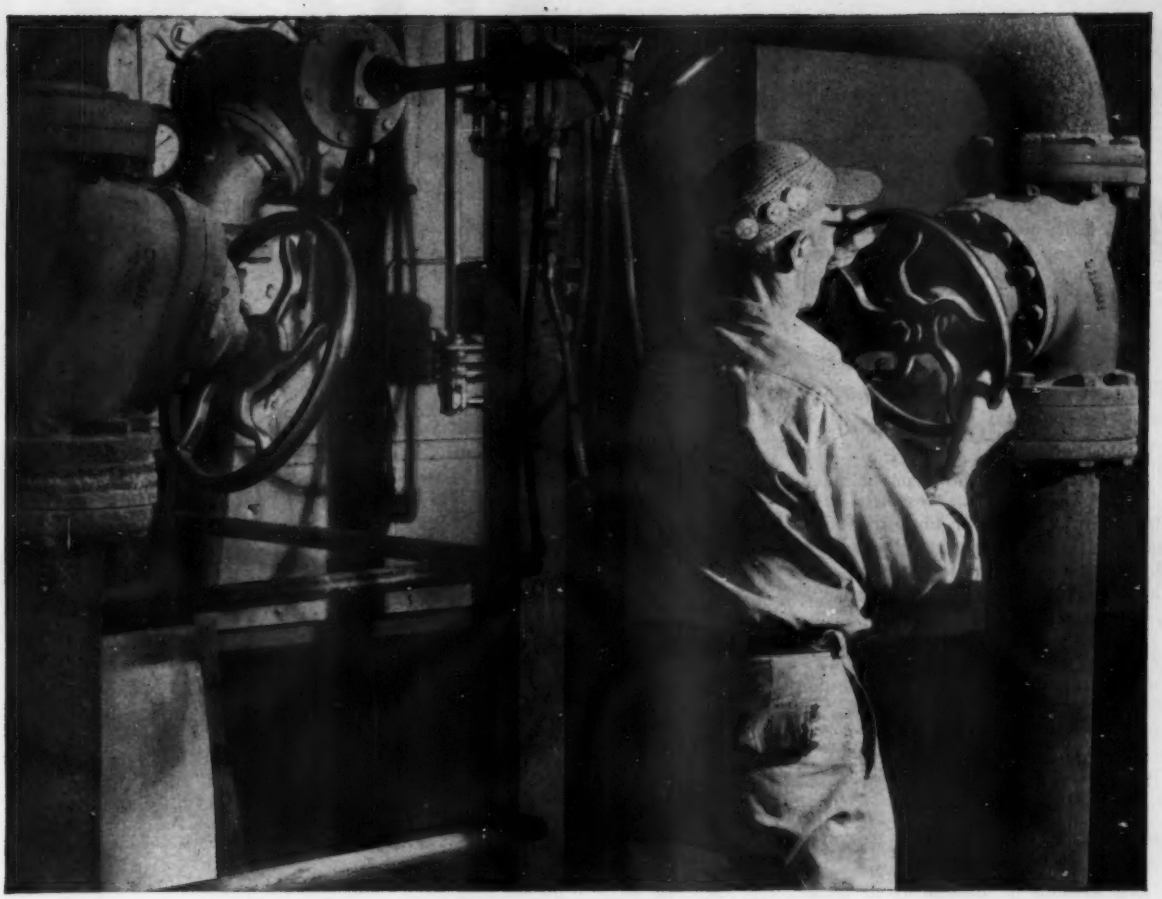
6—SAFETY LOCK guards against "unsafe" start-ups

The Lance Lock is designed to prevent starting of electrically powered or operated machines, apparatus or equipment—unless the safety door or



guard is automatically locked in place. It also serves as a protective device for high voltage equipment. The lock consists of a split transformer one half of which is fastened to the machine itself and the other half to the access door, operating lever, handle or other closing means. Only when both halves of the transformer are properly mated can the machine starting switch in the main circuit be closed. Likewise, the guard or door cannot be opened until the machine has been switched off.

The lock is so designed that when the two transformer halves are prop-



Crane diaphragm valves on gas lines to boilers...8 years with no maintenance

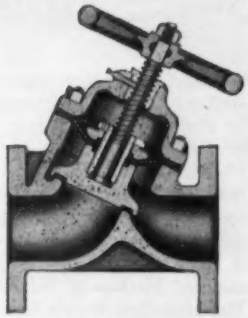
Before Union Electric Co.'s Venice Station, St. Louis, changed to Crane packless diaphragm valves, the plug valves used on natural gas fuel lines to boilers were causing costly maintenance. Records showed excessive repacking and accelerated seat wear.

Since changing to Crane valves in 1951, there has been no leakage, no seat wear, no trouble of any kind. Tight seating is assured by the resilient, neoprene disc-insert that actually absorbs hard foreign particles. The disc and diaphragm are separate members. The diaphragm functions only to seal the bonnet and is not subject to the crushing or severe flexing that can cause early rupture in ordinary diaphragm valves. The disc insures tight closure even if the diaphragm should fail. After eight years' continuous, maintenance-free service, the Crane valves still seat tight—show no sign of wear.

The same Crane features that perform so well on gas service save Union Electric many maintenance dollars on raw river water lines used for ash sluicing and on compressed air and other water lines. They can do the same for you.

Write for free booklet

Get the complete story on Crane diaphragm valves. Ask your Crane Representative for Bulletin AD-1942, or write to the address below.



Note separate disc-diaphragm construction. Diaphragm serves only as bonnet seal while disc does the seating—holds line fluid even if diaphragm should fail. Wide choice of body, trim and lining materials. Screwed or flanged ends.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Illinois—Branches and Wholesalers Serving All Areas

For more facts circle 593 on Reply Card

NEW PRODUCTS

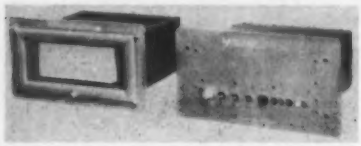
(Begins on page 188)

erly brought together and the starting switch turned on, the pivoted half of the transformer is attracted to the other half, mechanically locking both together, so that no lateral movement is possible. This also allows enough current to be generated in the secondary winding to close the machine power circuit. Lindly & Co., Inc.

7—OPERATIONS RECORDER is compact, rugged unit

This operations recorder operates only upon a change in the incoming signal in analog or digital channels. It is suggested for use in industries concerned with monitoring digitized or sequential data or special forms of analog-type data. An electro-sensitive record, for instant viewing, is produced by self-contained transistorized sensing circuits powered from an internal rechargeable nickel-cadmium battery. Recorder and control unit together require space of 17-by-17-by-17 in. There are no adjustments to make, manufacturer points out, and test controls are self-returning to operating position.

There are six off-on channels and one analog (digitized) channel. Record loading is through front panel. The chart is 3¾ in. wide. Marking is



by fixed styli, each excited from its controller. The instrument operates at standard chart speeds. Frequency response is 0-600 cps for the analog (digitized) channel and 0-200 cps on the off-on channels. The time at which an automatic record is taken is indicated electrically on the chart. Time is printed in binary form to nearest minute. Hathaway Instrument Div., The Hamilton Watch Co.

8—MULTI-PURPOSE LUBE in tubes for grease guns

This lithium-based grease is described as a lubricant that can be used on practically everything that moves. It is claimed to have the highest possible melting point, to provide rustproof security in operation or in storage and to offer maximum adhesion to metal under all weather and operating conditions. Pennzoil, South Penn Oil Co.

9—ELECTRICAL LOCK — no keys, no tumblers

Electro Dial is an electrical locking switch operated by manipulating the knob in a combination of numbers. Manufacturer says it can lock or unlock any electrically operated device from a buzz saw to a control panel—can secure the facilities of an entire plant or a single machine. Inside this lock are four plastic wheels, each with its own metal electrical contact points. By dialing the first number in the combination, the contact points of the first wheel are aligned to a fixed position. Dialing the second number brings the contact points to the second wheel into alignment with those of the first wheel. Dialing the third number aligns its contact points, and when the fourth number is dialed, the electrical circuit is complete and the switch is closed. To break the circuit, you twirl the knob in either direction, scrambling the position of the gears.

Besides speed of operation, Electro Dial offers other advantages. It can control one to four functions. It can be supplied with four different combinations, each performing a different job. You can turn on a light, ring a bell, unlock a door and start a drill press with just one lock. No locksmith is required to change combinations, it is stated. The lock is claimed pickproof and burglarproof because there are no tumblers—no sound, no feel of mechanical action to tell when contact points fall into alignment. Also, if desired, Electro Dial can be furnished with the dial portion detachable so it may be removed from the case assembly. Only thing visible on parts so locked is a tiny hole. Electro Dial, Inc.

10—DUST-CONTROL AGENT reduces airborne germs

Sani-Dust, is claimed to sanitize floors, walls and equipment within 15 min after treatment. It is applied as a dust control chemical to cleaning cloths and mops. Tests are reported to show that Sani-Dust-impregnated mops also provide a 30 per cent brighter floor. The product can be used on wood, tile, metal or plastic composition floors, shelving counters, desks and other surfaces normally wiped or mopped. Talb Industries, Inc.

11—COMPOUND, CLEANER recondition heating systems

Heat-Pep Cleaner, one of two new heating system compounds, is formulated to remove accumulated boiler rust and sludge. According to manufacturer, Heat-Pep Cleaner's action is physical, rather than chemical; it removes rust and sludge caused by corrosion and water impurities in old boilers and loosens core sand, oil and dirt common to new boilers. It vaporizes as it cleans, getting through the heating system as well as the boiler.

Tests of Heat-Pep Sealing Compound are reported to show that it works by finding its way to existing boiler leaks and sealing them immediately. It mixes with boiler water and boiler pressure causes the compound to form a permanent bond that becomes an actual part of the boiler, it is explained, providing a seal unaffected by expansion or contraction. J. A. Sexauer Mfg. Co.

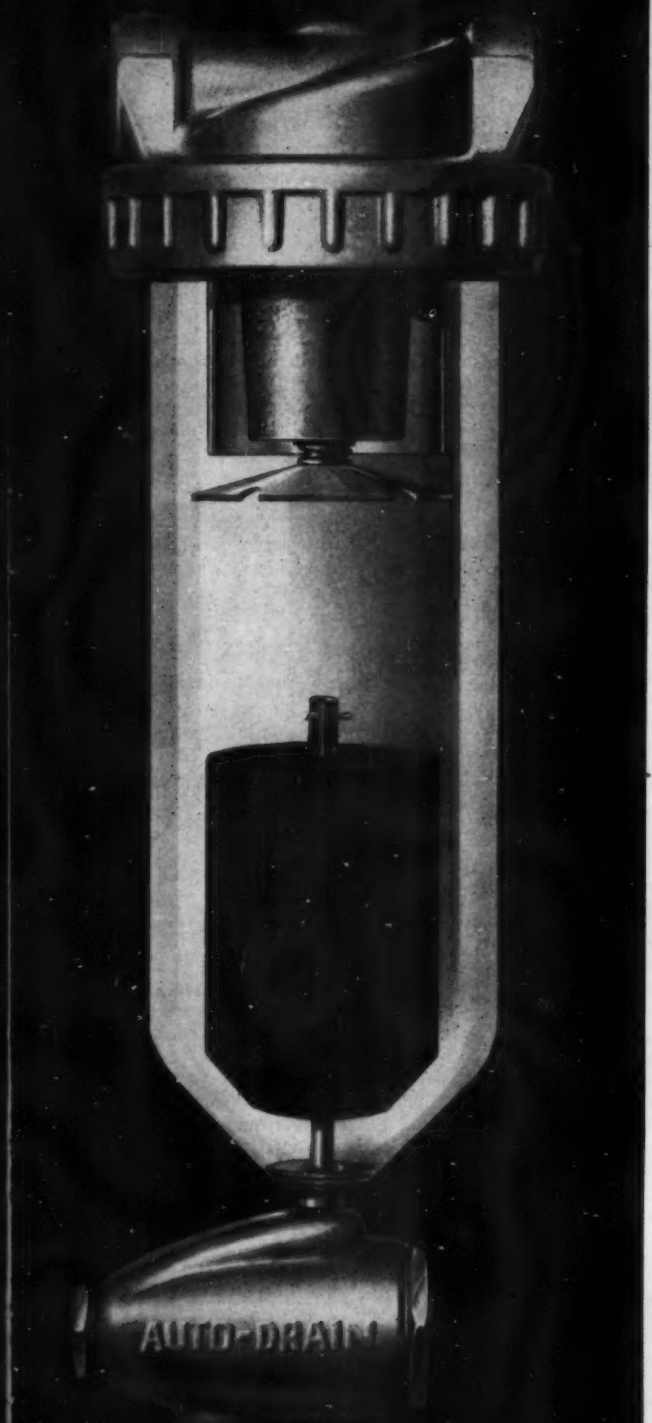
12—HAND TRUCKS keep contest at working level

Kennett Unilevel Trucks have a "floating bottom" designed to keep contents at waist level continually. They simplify in-plant distribution of products and parts because workers handle materials at the top of the truck without bending over. The spring-loaded hardwood bottom of these trucks is supported by heavy-duty torsion springs to permit the bottom to move up or down, according to the weight of the contents. A pantagraph arrangement of steel guide arms serves to keep the bottom level and in alignment, regardless of weight distribution. The trucks are available for handling loads to 450 lb. National Vulcanized Fibre Co.

13—COATING COMPOUND in decorative aluminum

Aluminized Static, an asphalt emulsion coating compound in gleaming aluminum color, is announced as a non-flammable product which will not flow in hot weather, nor stain or alligator or crack over any type of asphalt sub-surface. It is suggested for use on roofs, bridges, water tanks, other exposed surface areas. According to manufacturer, no other known form of bituminous coating, when ex-

NOW.....even more efficient!



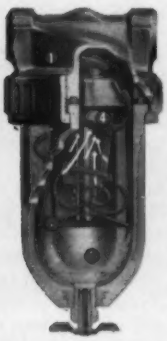
Watts "TORNADO ACTION" filter with new Automatic Drain

Designers — and users — of air-operated tools and equipment specify Watts filters because their superior filtering action and moisture-removing qualities have proved their efficiency. Now, with Watts' new automatic drain, you can have *truly automatic* filtering, too.

Watts "HIGH EFFICIENCY" filters remove condensate from air lines so effectively that draining of the bowl, in some instances, becomes necessary as many as three times daily. To meet the demand for labor-saving components, Watts has designed the "Auto Drain", a completely automatic drain filter which incorporates all the features found in the standard Series 602, 603 filters.

By use of the pilot principle, efficient and dependable removal of foreign particles and liquid condensate is attained. When liquid rises, the float admits air to the pilot valve chamber, opening a scavenger valve and allowing the trapped liquid and impurities to be blown out the drain opening.

Available in full range of sizes; ¼" through 1". Transparent bowls for pressures up to 150 PSI; metal bowls for pressures to 250 PSI.



How Watts "Tornado Action" removes condensate and dirt from air lines

Curved inlet (1) directs incoming air in downward helical pattern. Larger impurities and condensate are "thrown out" by centrifugal action, collecting on bowl sides and spiraling downward past baffle (2) into quiet chamber for draining-off. Baffle traps sediment in quiet chamber (3) and allows only dry air centrifugally cleaned of larger impurities to reach filter element (4) where finer particles are filtered out.

WATTS

FILTERS • REGULATORS • LUBRICATORS

YOUR SAFE SPECIFICATION

WATTS REGULATOR COMPANY, 14 Embankment Road, Lawrence, Mass.

Write for free technical catalog:

For more facts circle 594 on Reply Card

Charts, diagrams, and performance data enable you to specify the correct Watts pneumatic equipment

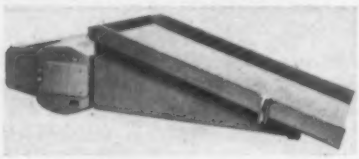
NEW PRODUCTS

(Begins on page 188)

posed to weather, will outlast Aluminized Static, and this product also has good retention of brilliance and reflectance. The compound is easily brushed on and dries fast, company states; it is self-priming and adheres to metal, glass, masonry, rock or asphalt covered surfaces, forming continuous tough, protective films. It is also said to have good waterproofing qualities and to "bridge" small voids, such as pin holes in oil, rusted sheet metal. The Flintkote Co.

14—VIBRATING FEEDER for processing equipment

No. 6-D Feeder is designed for heavy duty, has a capacity to 1000 tons per hour and is suitable for feeding controlled tonnages from bins, hoppers to



belt, crusher, pulverizers, kiln, grinding mills, scales, etc. It is equipped with 60- by 90-in. open pan deck, renewable wear resisting liner and can be furnished with various deck styles. Catalog 930 describes this feeder. The Jeffrey Mfg. Co.

15—COMPOUND protects the motor stator windings

Hysol 10-55, a two-component system, is formulated to protect electric motor stator windings against moisture, dirt, abrasives, and chemicals. Its thixotropic characteristic allows the use of a "butter technique" in application. Even on hot stators, no dripping or run-off is encountered during use, and flexibility prevents cracking during temperature changes, company says. Usual curing oven temperatures are used for preheating the motor, also for curing the compound. Houghton Laboratories Inc.

16—WOOD FINISH protects, toughens cellular structure

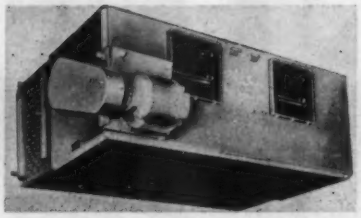
Newvar is formulated to penetrate deeply and adhere to wood fibers, providing a non-peeling, non-flaking surface. Newvar is claimed resistant to water, oil, grease, dirt, alcohol and alkali, suitable for use on indoor or outdoor wood structures, and to provide lasting protection from weather and wear in a single operation. To achieve maximum benefit from this finish on bare wood, manufacturer recommends thinning the first coat with naphtha and when dry, brushing on two additional coats of unthinned Newvar. The result is described as a satin gloss finish capable of withstanding heavy traffic of men and machines. Newvar comes in clear for natural wood grain effect, and in six functional colors. The Pentone Co.

17—SWITCH STARTER uses a ceramic condenser

The re-designed Glo-Switch Starter, FS-2, has a ceramic condenser for long service and fast starts under all atmospheric conditions. The switch is inside a glass "bottle" filled with inert gas. The electric discharge through the gas creates heat which closes the normally open, equal length bimetal switch contacts and energizes the lamp cathodes. Upon contact in the switch, the arc is extinguished and the gas cools, allowing the bimetal contacts to return to open position and start the lamp. The starter is for use with 14-, 15- and 20-w lamps. Pass and Seymour Inc,

18—DAMPING DEVICE for use on limit switch

This damping attachment is claimed to eliminate contact transfer or telegraphing which might result from limit switch arm snapback. For use on manufacturer's Type A oil-tight limit switch, it also increases total travel of the arm from 30 to 120 deg. The attachment can be used with any arm. Typical applications include conveyors and automation equipment where precise actuation by means of a cam may not be practical. Bulletin 9007-GA gives information. Square D Co.



19—CONDENSER, air-cooled, requires minimum space

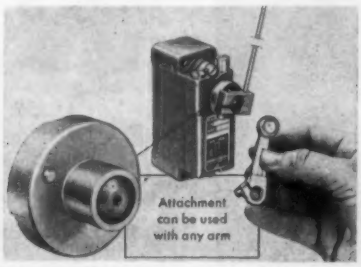
The AL Aircon is a blower-type air flow air-cooled condenser featuring low silhouette appearance which makes roof installations rarely visible from the ground and minimum space requirements for indoor ceiling suspension. When equipped with optional accessories, the AL Aircon serves the dual purpose of refrigerant condensing as well as heating and ventilating. It comes in seven models with nominal capacities from 10 to 50 tons, for indoor or outdoor applications. It has forwardly curved, centrifugal fans with large outlet housings for quiet operation. Sixteen unit arrangements and six fan discharge arrangements for indoor or outdoor applications are available. McQuay, Inc.

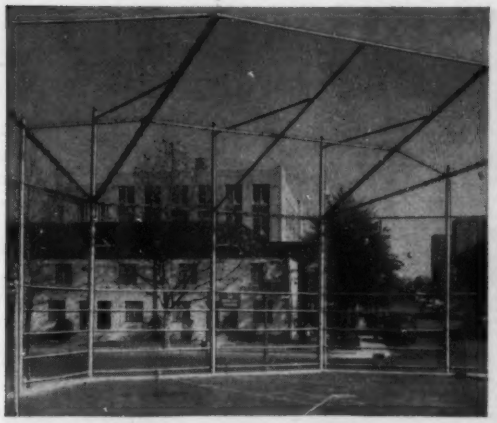
20—CABINET OVENS, gas or electrically operated

These drawer-type cabinet ovens with heat ranges from 200 to 800 F are announced as featuring close temperature control, compact overall dimensions, rugged construction and low initial cost. They can be operated with either gas or electricity. The W. W. Sly Mfg. Co.

21—CURTAIN WALLS for plant, office interiors

Installation is reported fast and easy with these movable walls and partitions made with aluminum. Features announced include non-load bearing panels readily attached to or removed from the framework, independently of each other; color and choice of material to match interior decor; and raceways for wiring installation with snap-on covers that afford flexibility in outlet placement for phone outlets.





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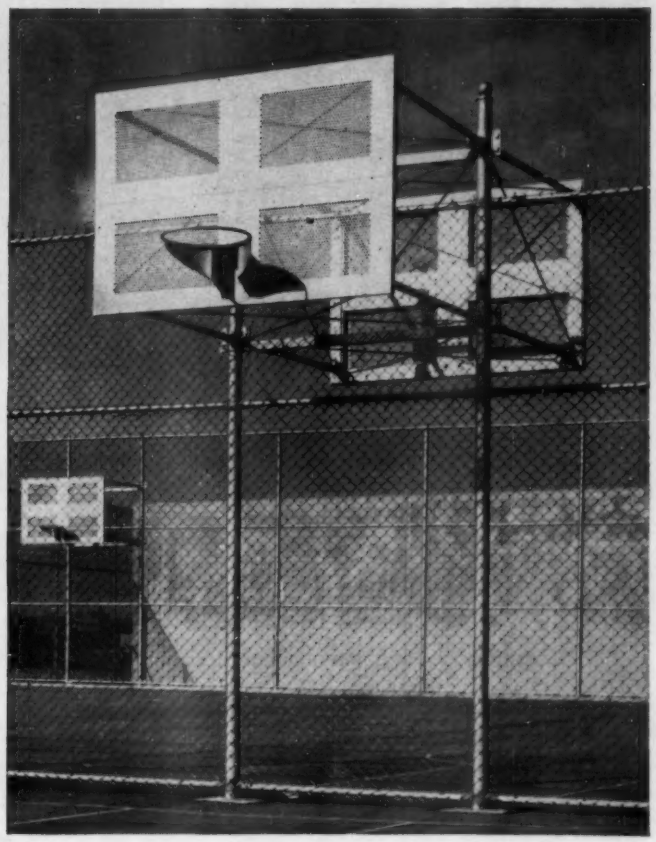

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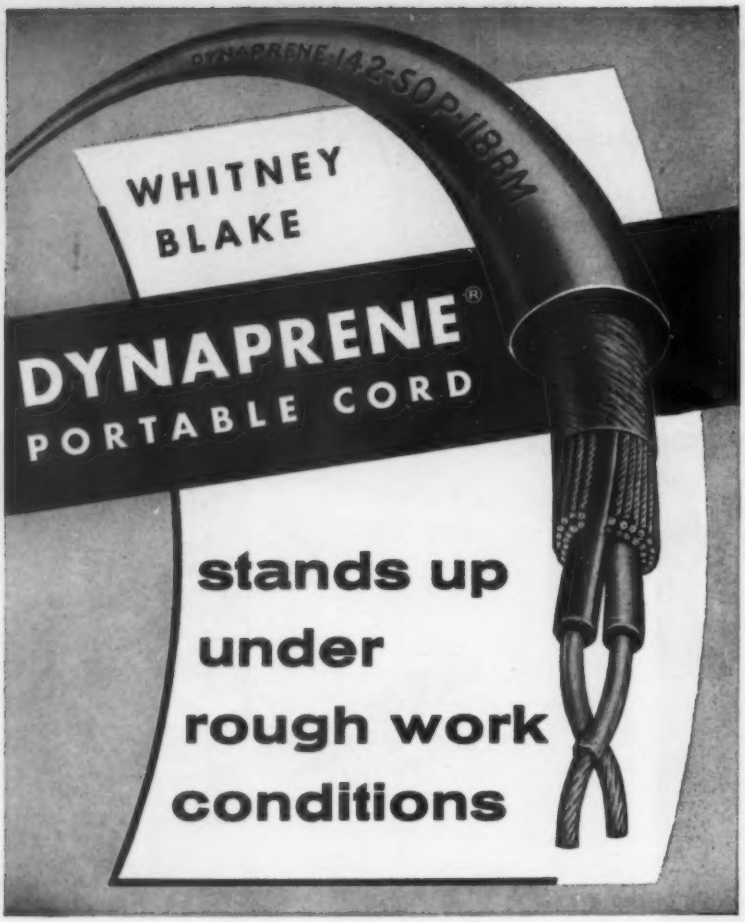

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WHITNEY BLAKE COMPANY

NEW HAVEN 14, CONNECTICUT

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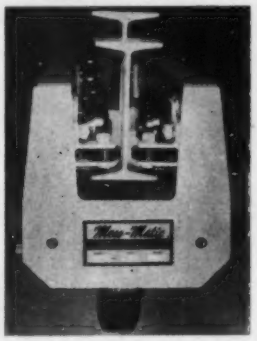
NEW PRODUCTS

(Begins on page 188)

sockets or switches. Doors are supplied with same facings and finishes as panels. Facing materials available include Masonite, sandalwood, Transite, ash, anodized aluminum, mahogany, Marlite, simulated wood grains, sound absorbing materials. Aluma-Wall Partition Co.

22—UNDERHUNG CRANE runs on 40 I-beam sizes

The Meco-Matic Crane is announced as operable on over 40 standard structural I-beam sizes, wide flange beams and hardened monorail track. The end trucks will also traverse the junction of unlike beams. The suspension



principle involves free-floating flangeless wheels and side guide rollers which bear against the web of the beam rather than against the flange. The same unit may be motor-driven, hand-geared, or of the "push" type.

In the power unit, the usual high-speed cross shaft and open end truck gearing is replaced by a center-mounted motor, with reduction gearing unit operating in an oil bath. This drives into the cross shaft directly at low speeds. At the ends of the cross shaft, large rubber tires drive against the undersides of the runway rails. The result is said to be smooth, quiet action. Versatility of this crane is possible because end truck wheels are flangeless and aligning. Alignment is supplemented by side guide rollers bearing against the beam web, acting as rolling flanges and also as safety lugs. Mechanical Equipment Co., Inc.

23—BRAKES offer higher torque ratings

Series 42,000 Brakes now offer torque ratings of 125, 175 and 230 ft-lb, and will soon include those of 575 ft-lb. These brakes have a flange suitable for mounting on the NEMA C flanges of motor frames 324UC through

when the pressure is on you need PEN-O-LED® EP

When production is up, a breakdown can be dangerously costly. Maintenance costs compounded with lost orders add up big in the profit squeeze. That's why in important places—such as gear drives subject to high pressures—you need Pen-O-Led EP, for protection against wear and costly down-time.

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NEW PRODUCTS

(Begins on page 188)

405UC, are shorter and lighter than many comparable models now available. They come in both a-c and d-c models, in standard or dust tight, waterproof enclosure. They retain manufacturer's "unitized" construction, in which the entire operating mechanism is attached to a single plate for ease of dis-assembly and assembly, a single solenoid, two lead wires, single point adjustment for lining wear, single point manual release, torque adjustment downward from the maximum. Stearns Electric Corp.

More information of any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 287-288.

24—WATER TANK with central supporting column

The all-steel Aquatore—a large capacity elevated water storage tank—looks like a huge "doughnut in the sky," according to company, and offers some special advantages because of its central supporting column which makes struts and tie rods unnecessary. The fluted center column and clean simple lines lend a distinctive appearance. Maintenance costs are lower, it is noted, because there are no difficult-to-paint struts, tie rods, balcony floors and rails.

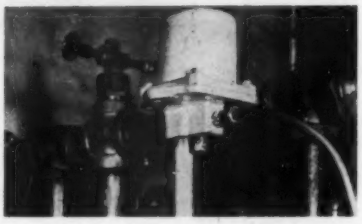
More constant water pressure, as compared with that afforded by conventional type towers, is also announced. The Aquatore is said to

offer a significant reduction in the head range of the actual storage tank, permitting comparable water pressure at less height and providing less variation in water pressure. A separate pump house isn't required because pumping facilities can be installed within the column. Other features include less height (because of lower head range), of importance where planes are a factor; reduction in snow-load and wind-load because of smooth tank surface; and a single foundation. Manufacturer points out that while 3 million gallons is ordinarily considered the largest practical capacity for most applications, there is no limit to the capacity in which the Aquatore can be constructed. Graver Tank & Mfg. Co., Div., Union Tank Car Co.

25—INSTRUMENT measures gas, fluid or vapor pressures

Model 328 Resistance Pressure Detectors measure gas, fluid or vapor pressures in combination with company's Omniguard monitor. Pressure is converted directly to an electrical resistance. The detectors are described as rugged, accurate, inexpensive. A variety of ranges is available so that low pressures, measured in inches of mercury, to pressures of 3000 psi can be watched constantly on the same Omniguard instruments that monitor critical temperatures.

For pressure under 30 psi. a pre-



cision capsule is the sensing element. From 30 to 3000 psi, Bourdon tube elements are used. The pressure sensing element linearly varies the terminal resistance of a low temperature coefficient alloy winding to permit operation over ambient temperatures of 32 to 150 F. Model 328 is 2-5/16 in. in diameter, 2⅛ in. long. It is normally mounted in a pressure detector head, as shown. Bulletin 3051 gives details. Thomas A. Edison Industries, McGraw-Edison Co.

26—HOSE CLAMP, easily used, single lug type

The Single Lug Mechanical-Loc Circle Clamp, a one-piece device for low pressure hose and tubing, is designed to clamp permanently with only one squeeze of a single tool. It has one U-shaped locking lug instead of the usual two or three on company's standard clamps, and this single lug is said to result in greater setting speed, and to work equally well on rubber and synthetic hose. Squeezing

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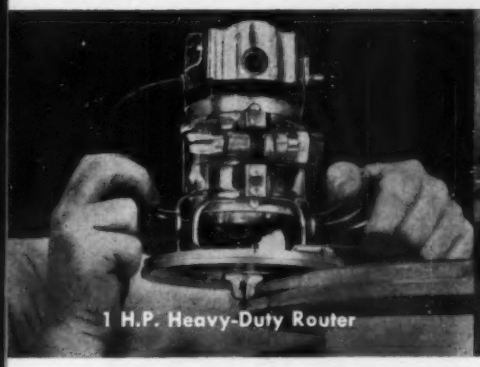
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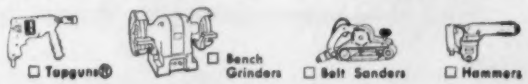


NEW PRODUCTS

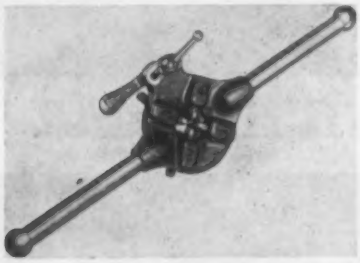
(Begins on page 188)

the Clamp's U-shaped locking lug tight decreases the inside diameter of the clamp, so that it binds the hose to its fitting. At the same time, it is explained, the clamp metal (SAE 1010 steel) takes a permanent "set" in place and cannot work loose due to vibration, pressure or twisting.

Only one tool is needed to apply the clamp—a toggle-action pliers which develops a 12:1 mechanical advantage. With this tool, the clamp can be removed for re-use. Ordinary pincers pliers can also be used to tighten the locking lug, and if removal is necessary, the lug is simply snipped off. The clamp comes in 15 sizes from 0.42 to 1.22 in. ID. Circle Clamp Div., Cuyahoga Products Corp.

27—BOLT THREADER speeds power drive threading

Compact Ridgid 101 Bolt Threader is designed for fast, easy threading. One die head serves 10 bolt die sizes



from ¼ to 1 in. A set of four full-width dies of desired size can be inserted in the die head. A quick-opening lever retracts dies for fast removal of threader from bolt without stopping drive. The Ridge Tool Co.

28—SAFETY GLOVES come in four new types

These gloves are offered for light welding and general industrial work requiring some safety protection. Type E-GR is a chrome tanned, green cowhide glove with full gauntlet for light welding where protection of hand, wrist and lower arm is necessary. Type D-SS is a combination light-work, light-welding glove. Economical, it is of chrome tanned cowhide with reinforcements at gauntlet seam, palm seams and thumb crotch. Type AR-1, is a high grade heat resistant green leather welder's mitten designed to allow freedom of movement for thumb and index finger. Type GR-SS is a flexible, driver style glove of green chrome tanned leather for miscellaneous work where light protection is required. Air Reduction Sales Co., Div., Air Reduction Co., Inc.

29—STEM CASTERS for light-medium truck duty

For maximum maneuverability, stem-type casters in the K400 Series have double ball bearing swivel construction, with two rows of steel balls in

separate lubricated hardened raceways. The wheels, measuring 3½, 4 and 5 in. in diameter, come with plain bearings, ball bearings, or thread-guarded roller bearings. Semi-steel, rubber-tired, Ruberex, Rockite and semi-pneumatic types of wheels are available; wheel brakes are optional. The 2½-in. long stems are made in round and octagonal shapes. Load capacities range from 175 to 280 lb per caster. Faultless Caster Corp.

30—TRANSFORMER, external mounted, bushing type

The Versaformer, an external mounted bushing type current transformer, for power transformers and breakers, is designed for circuit relaying, indicating or protection. It is installed on existing units by merely slipping it down over a power bushing, eliminating untanking procedure and protective housing. The Versaformer is cast in epoxy resin to make it weatherproof and resistant to salt or acid atmospheres. It needs no painting. Furnished with a 4-in. adjustable mounting bracket, it can be used with standard ASA bushing, 34.5 kv or below. It has a junction box suitable for conduit connections. Minimum current rating is 400/5 amp. Allis-Chalmers Mfg. Co.

31—HEAT PUMP is 5-ton, air-to-air unit

The RHP-53 Heat Pump is announced as having a "super sensitive control system" that senses outdoor temperature and regulates indoor temperature accordingly, it is explained. Thus, it compensates for faster heat transfer

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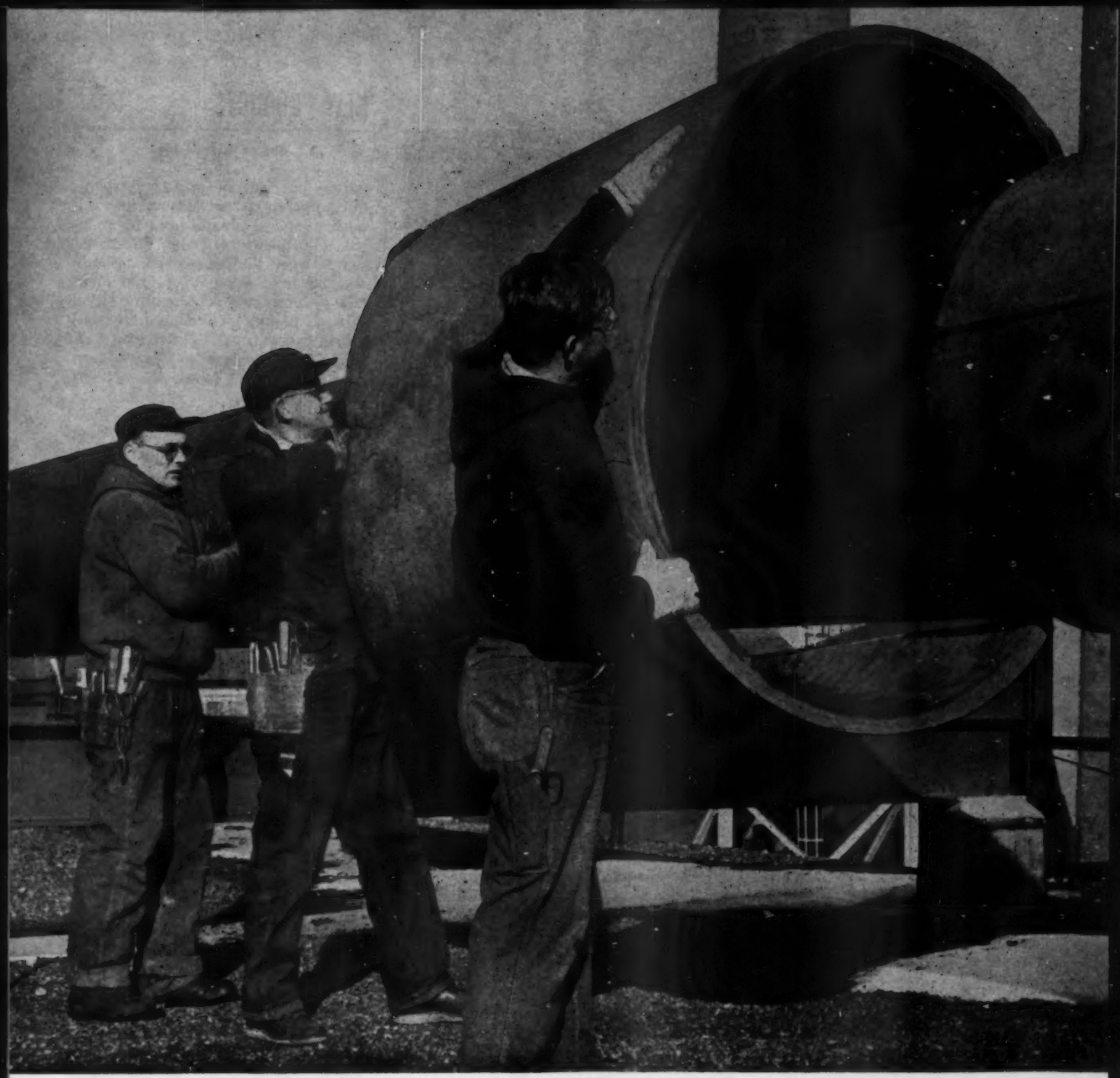
WASHINGTON, D. C., Walter E. Campbell Co., Inc.
WICHITA, Kans., General Metals, Inc.



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"OUT OF PRODUCTION FOR THREE DAYS? THAT'S WHEN WE'RE SUPPOSED TO SHIP!"

"And believe me, that wasn't all the boss said! Two key machines were so clogged with dirt and grime we had to disassemble and clean them—overnight! Between overtime for the repair crew and our own crew, I managed a partial shipment in three days. And I made up my mind this wasn't going to happen again!

"I'd heard of preventive maintenance with Torit Dust Control equipment—and the Torit representative I called sure opened my eyes! Clean machines hold close tolerances better and up to 80% longer! Torit collectors remove over 99% of dust and air-borne debris, save on both the cost and frequency of servicing.

"I expected there'd be a hitch on prices—but look what I found out: our production breakdown cost nearly as much as the Torit equipment we needed! And just while Torit Dust Collectors are being depreciated we'll make money on them —through maintenance savings, improved production, and reduced down-time!

"The boss actually congratulated me when I showed him the savings Torit preventive maintenance gives us!"

Torit Dust Collectors stop dust build-up before it costs you money. They're available in both high efficiency cyclone and cabinet type units. Why not check into them today—write:

TORIT manufacturing company

Dept. 1820, 1133 Rankin Street, St. Paul 16, Minnesota

For more facts circle 601 on Reply Card

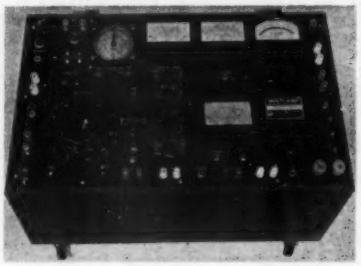
NEW PRODUCTS

(Begins on page 188)

during intervals of greater temperature differential between inside and outside, and eliminates need for manual adjustment of room thermostat setting when the outdoor temperature changes. In addition, it is said to maintain a constant indoor comfort level through periods of fluctuating or unsettled weather. A split-system heat pump, it has separate indoor and outdoor sections. The former, of modular construction, can be assembled for vertical counterflow or horizontal flow of air. It uses a large, squirrel-cage blower with rubber-mounted motor which can be set for automatic or continuous operation. The outdoor section, with full-size outdoor coil and automatic defrost controls, has a vertical discharge to prevent damage to shrubbery without need for a shield. Supplementary duct heaters for this pump are optional accessories. Westinghouse Electric Corp.

32—RELAY TESTER has three metered current sources

Multi-Amp Tester Model IDR-35/MT -1 is an all inclusive unit designed for testing a full range of a-c current and voltage activated relays, also circuit breakers, current transformers and their insulation resistance. Line cords and test leads are supplied. The tester has a continuously adjustable transformer for current or voltage load, plus suitable instrumentation. One



metered source is a reactor circuit available for general relay testing. The reactor supresses harmonics caused by saturation of core structure on certain types of relays. The second current source is an auxiliary for differential relays; the third source is a direct current for target and seal-in relays. The a-c voltage source is also metered.

The 2-kva, 240- or 120-v, 60-cycle, single-phase tester has outputs of 20 amp at 100 v (25 amp at 80 v) for general relay testing, or 200 amp at 10 v for current transformer testing; 6 amp at 24 v a-c for differential relay testing, and 4 amp at 8 v d-c for

How many spare parts should you stock per pump?

"You may be *over*stocking," says Phil Olmstead, *Chief Engineer*, Goulds Pumps, Inc.

"There are many times," one plant manager told me recently, "when we have a *higher* inventory of spare parts than the people we buy from!"

No laughing matter, this—many plants today are faced with the difficult problem of keeping stocks *adequate*, yet keeping inventories *down*. If your problem is *pump parts*, you can do both—by *interchangeability!*

For instance, take the Goulds Fig. 3405 single-stage centrifugal. You can get it in 33 sizes, with 66 combinations possible, considering right- and left-hand rotation. *Just 3 groups of parts fit all 66 combinations of this pump!*

That means that, for every three to five pumps of a given group size (sizes are divided up three ways into "small," "medium," and "large" groups), we can recommend that you stock just one shaft, one set of bearings, sleeves, mechanical seals or packing. *In short, all parts are interchangeable except casings, casing covers and impellers!*

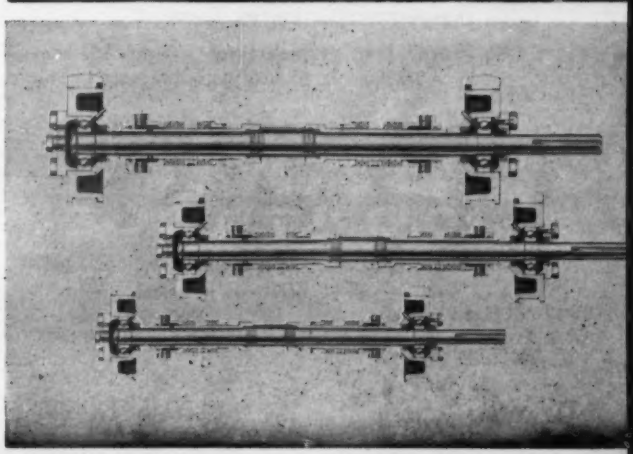
How much can that cut down your inventories? You figure it out—*one* set of group parts for as many as *five* pumps, where you might expect to stock one for each. *Three* groups for *thirty-three* different sizes of pumps—a *91% cutdown!*

And here are three more advantages to consider:

1. You can make changes *in the field* to meet new needs.
2. You receive off-the-shelf delivery of parts you order.
3. Initial cost is lower due to standardization in manufacture.

The next time you talk to a Goulds representative, ask him to show you how interchangeability works in our Fig. 3405 . . . and in the rest of our line, too. If you want information right away, drop a line to me, Phil Olmstead, at Goulds Pumps, Inc., c/o Dept. PE-109, Seneca Falls, N.Y. I'll see that you get all the information you want.

GOULDS (GP) PUMPS



Just three groups of shafts, sleeves, bushings, glands, packing, ball bearings, bearing shell, end caps, closures and gaskets for Goulds Fig. 3405 pump to fit all 33 pump sizes.

For more facts circle 602 on Reply Card

FLEXIBLE PRODUCTION LINES with MOBILE MACHINERY!

Today's competitive market challenges the manufacturer to adapt quickly to new cost-reducing methods and systems — new and improved processing techniques.

Patented Leveling Feature

One important answer to this challenge is plant flexibility through machine mobility.

Modern production facilities no longer bolt their machinery to the floor. Machines on Barry Leveling Mounts are mobile — regardless of size, weight, or type of operation. Easily moved, and installed without drilling, lagging, or shimming, these mobile machines are readily adaptable to changing production requirements.

Proof! One manufacturer moved 86 heavy-duty machine tools in a five-week period without interrupting production. Ask for detailed report on "Resilient Mountings as Applied to Production Machinery".

BARRY CONTROLS
INCORPORATED
700 PLEASANT ST., WATERTOWN 72, MASSACHUSETTS

For more facts circle 603 on Reply Card

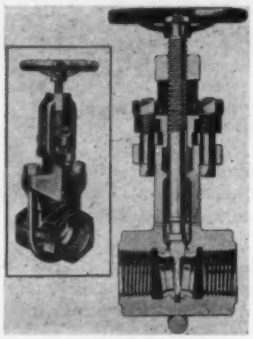
NEW PRODUCTS

(Begins on page 198)

target and seal-in relay testing; also outputs of 150/300 v a-c at 0.5/0.25 amp, 140 v at 1.5 amp. Multi-Amp Electronic Corp.

33—GATE VALVES designed for corrosive applications

Causul metal gate valves in the improved Fig. 1910 series come in sizes ½ to 8 in., with screwed or flanged ends, "King-clip" or bolted bonnet type, with stainless steel or Monel trim, and are rated from 175 to 225 lb, w.o.g. Principal change announced



is the fullway design with full seat openings that maintain pressure and flow at maximum for any specific size. Bodies, bonnets and glands are made of causul metal, an austenitic iron containing about 20 per cent nickel and substantial percentage of copper, chromium and molybdenum. These valves are claimed to handle sulphuric acid over a range of concentrations, alkalis and other corrosive fluids. Outside stem and yoke construction is used in both designs. This places the stem threads out of the solution the valve carries. Discs are solid Monel or stainless steel. Lunkenheimer Co.

Use the Reader Service Cards provided on pages 287-288 to ask for more information on the products. Circle item numbers of products in which you are interested.

34—RUBBER SHEETING for covering chutes, patching

Armorline is announced as an abrasion-resistant, adhesive rubber sheeting for do-it-yourself covering of chutes and launders or patching of conveyor belt surfaces. According to company, Armorline can be easily ap-

for low cost . . . heavy-duty

Sanding or Grinding

and MORE Man-Hour Productivity

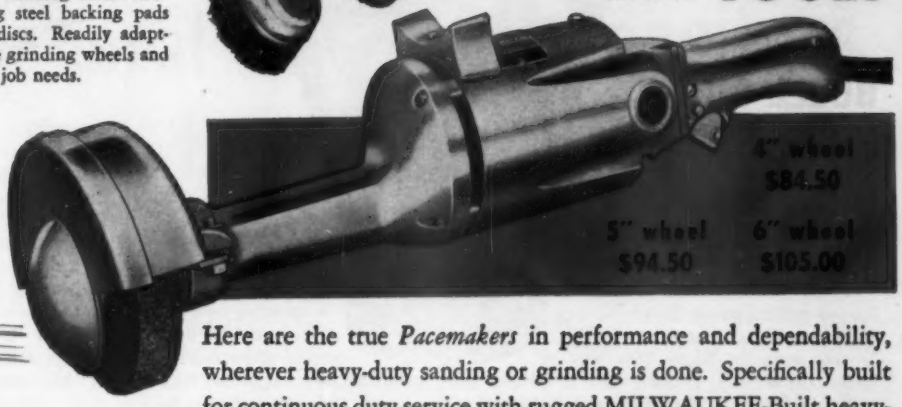
SANDER GRINDERS. 3 models . . . 7 or 9 inch disc. 5000 RPM. For sanding metal or wood; grinding down welds and casting ridges; cleaning structural steel, tanks, boilers, vats, sheet metal, cutting casting risers and dressing down soldered joints.
7 inch model.....**$89.50**
9 inch model (as illustrated) **$99.50**

Milwaukee

HEAVY-DUTY

electric **TOOLS**

Available with either safety reinforced grinding discs or highly flexible cool running MILWAUKEE Exclusive nested spring steel backing pads and spiral abrasive sanding discs. Readily adaptable too for use with cup-type grinding wheels and wire brushes to meet specific job needs.

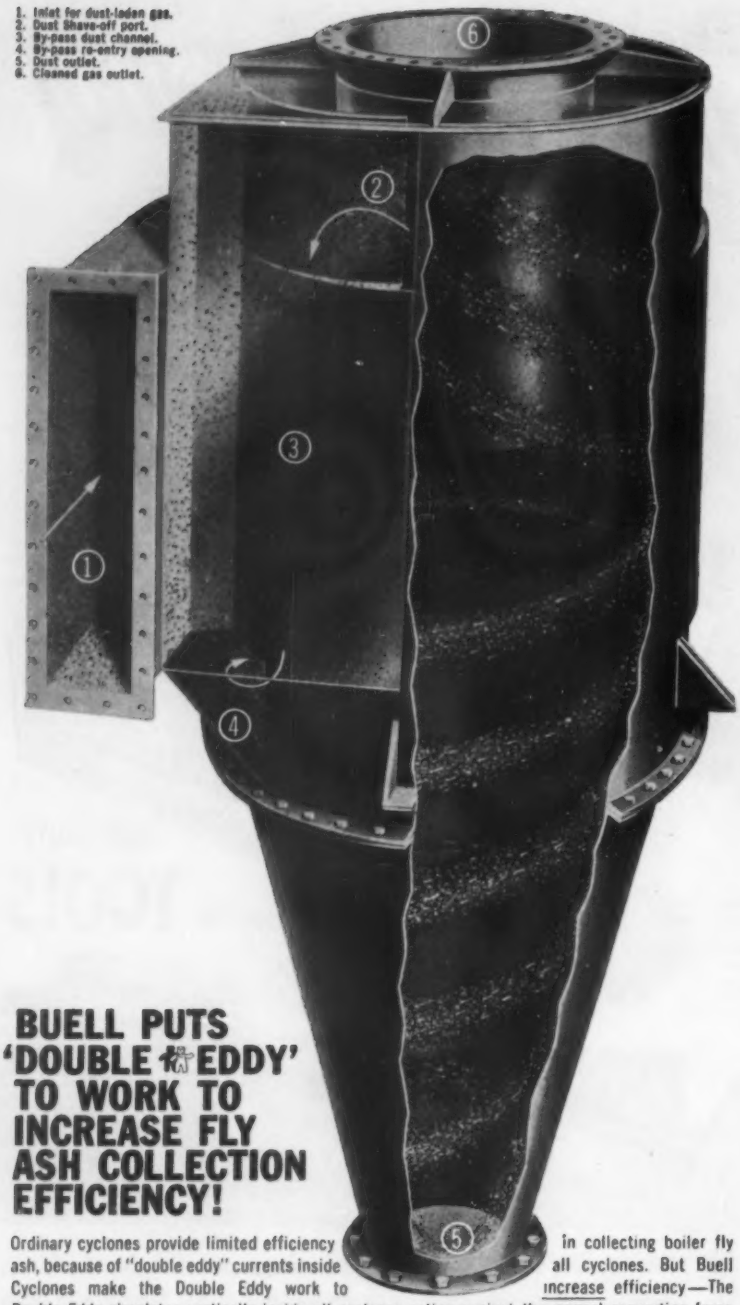


Here are the true *Pacemakers* in performance and dependability, wherever heavy-duty sanding or grinding is done. Specifically built for continuous duty service with rugged MILWAUKEE-Built heavy-duty AC-DC motors providing an abundance of dependable, stall-proof working power to see you through the toughest kind of jobs.

AERIAL GRINDERS. 3 models . . . 4", 5" and 6" wheel diameters . . . 4000 to 6000 RPM. For preparation of surfaces for welding; to smooth off welds, snag and grind castings, remove rust, scale and old paint, general cleaning and buffing.

See your nearby MILWAUKEE Distributor for a convincing demonstration of these and other MILWAUKEE Time Saving . . . Cost Cutting Tools . . . or write for free catalogue to: MILWAUKEE ELECTRIC TOOL CORPORATION, 5374 West State Street, Milwaukee 8, Wisconsin.

For more facts circle 604 on Reply Card


1. Inlet for dust-laden gas.
2. Dust Shave-off port.
3. By-pass dust channel.
4. By-pass re-entry opening.
5. Dust outlet.
6. Cleaned gas outlet.

BUELL PUTS 'DOUBLE EDDY' TO WORK TO INCREASE FLY ASH COLLECTION EFFICIENCY!

Ordinary cyclones provide limited efficiency in collecting boiler fly ash, because of "double eddy" currents inside all cyclones. But Buell Cyclones make the Double Eddy work to increase efficiency—The Double Eddy circulates vertically inside all cyclones acting against the normal separating force of the spinning stream of gas and ash. Buell Cyclones have a narrow "Shave-off" port (2) at the top of the casing. This port catches and removes ash trapped in the Double Eddy. It makes the cyclone more efficient instead of less.—Only Buell Cyclones have the Shave-off. And only Buell Cyclones combine this efficiency with large diameter: they will not clog or plug even with loadings up to one pound of ash per cubic foot of gas. No field fitting is needed: they are completely assembled and match-marked before shipment. They can be completely lined, inside and out, against heat, corrosion and abrasion.—For a list of installations near you, a copy of our Catalog 103, or other information, call our nearest representative, listed in the telephone classified directories of most major cities under "Dust Collection Systems". Or write Dept. 14-J, Buell Engineering Company, Inc., 123 William Street, New York 38, New York. (European Subsidiary: Ambuco Limited, London, England.)

EXPERTS AT DELIVERING EXTRA EFFICIENCY IN DUST RECOVERY SYSTEMS: CYCLONES—"SF" ELECTRIC PRECIPITATORS—COMBINATION SYSTEMS—DRY CLASSIFICATION SYSTEMS.

buell®

For more facts circle 605 on Reply Card

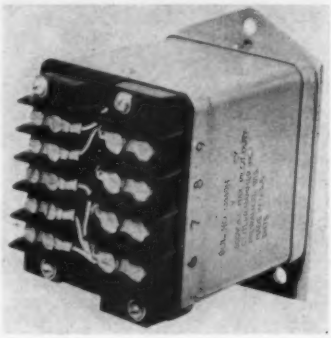
NEW PRODUCTS

(Begins on page 188)

plied to metal, concrete, wood and other materials. A thin gage of tacky rubber is bonded to the bottom side of the material, protected by Holland cloth which is removed before use. The method is said to require neither expensive tools nor special skill. Armorline is made from a rubber compound claimed to greatly outwear steel of the same thickness in abrasive service—abrasive particles bounce off the soft surface. Armorline comes in rolls 50 or 75 ft long, depending on gage, 48 in. wide. B. F. Goodrich Industrial Products Co., Div., The B. F. Goodrich Co.

35—RELAY DEVICE for monitoring overtemperature

This direct monitoring overtemperature relay device consists of a magnetic relay, two transistor amplifiers, a diode network for signal separation and a voltage regulated power supply. Designed to protect three-phase



a-c-motors, this relay is reported suitable for use wherever overtemperature is a problem. It permits use of equipment without danger of overheating, it is stated, because the component responds only to the actual temperature of the protected equipment. This is because the thermistor is inserted in the windings of the motor, generator or transformer. Power supply ratings are 110, 208/220, 440 or 550 v, 60 cycles. Contacts are pilot duty, 600 v a-c. Cutler-Hammer Inc.

36—SYNCHRONOUS MOTOR stops, starts, reverses, steps

Called Slo-Syn, this enclosed permanent magnet type synchronous motor is adaptable for servomechanisms, automatic machines, remote control and numerical control systems. At 60 cycles, company says, the speed remains at 72 rpm without gear reduction. Torque is conservatively rated at 150 oz-in. It is pointed out that a

PAYMENTS OUT OF SAVINGS

Let General Electric Capacitors Pay for Themselves

Now you can realize the benefits of capacitors without tying up working capital or your credit line. General Electric's new Time Purchase Plan allows you to take full advantage of the power-bill savings that G-E capacitors make possible. You can use the money that capacitors save in reduced power costs, released system capacity, improved voltage levels, and reduced power losses to make the monthly payments provided for by the plan. You pay as you save.

Check these General Electric Time Purchase Plan benefits . . .

- You can purchase capacitors on a monthly basis . . . it's easy and convenient.
- Your working capital and credit line remain intact.
- You can purchase additional General Electric capacitor units and equipments by simply amending the original contract.

Find out how your capacitors can pay for themselves. Let your General Electric sales representative recommend a Time Purchase program suited to your needs. He'll be glad to help you. Contact your nearest Apparatus Sales Office, or write Section 446–8, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

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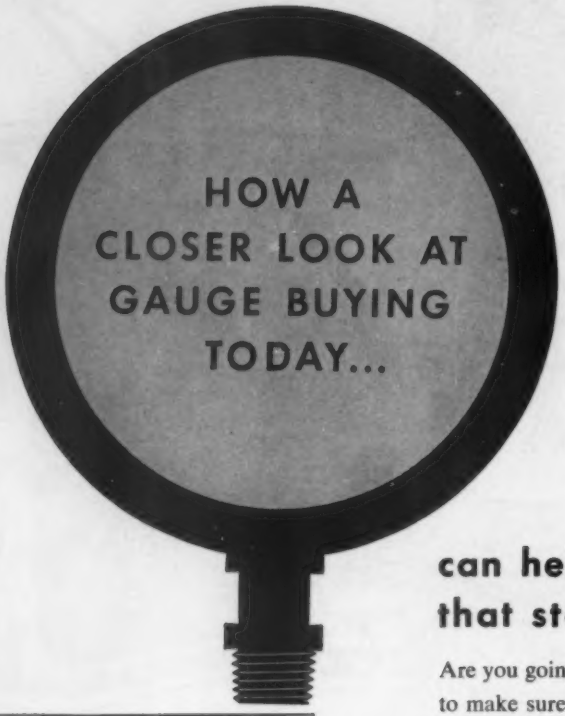


can help you pick gauges that stay on the job

Are you going to a higher price on gauges in order to make sure of gauge reliability? "Over-gauging" to get long life? It will pay to take a closer look at the size, flexibility, and high standards of accuracy of the United States Gauge line. At USG you can choose from over 50,000 standard indicating dial pressure gauges. Thousands of choices in case styles, sizes, materials, and in gauge components. Thousands of specials, too! Not only can you pinpoint your *reliability factor,* you can pinpoint your *price* for 99% of your gauge needs . . . from one line! It's easy to check . . . just call your USG distributor for your next gauge requirement. See the Yellow Pages, or write for catalogs and name of your distributor.

PICK exact Bourdon tube to meet stress, over-pressure, pressure range.

PICK Ni-Span "C" low pressure elements for exceptional thermal stability.

PICK Supergauge® for long life, accuracy to 0.5%.

PICK Solfrunt® for accuracy to 0.5%, solid-front safety from blow-outs.

USG **UNITED STATES GAUGE**

Division of American Machine & Metals, Inc., Sellersville, Pa.

Find Your Nearest Distributor in the 'Yellow Pages'

PICK Test Gauges for dependability, and accuracy as high as 0.2 of 1%.

PICK Recorders and Recording Controllers built to stand vibration, pulsation.

PICK A-Line for premium reliability, accuracy to 1%, and savings up to 40%.

PICK Arc-Loc® Movement for longer life, easier and lower maintenance.

PICK U. S. Gauge Indicating Controllers or Transmitters for reliability.

For more facts circle 607 on Reply Card

NEW PRODUCTS

(Begins on page 188)

single-pole, three-position switch can give instant starting, stopping and reversing control because the motor has three leads. When used as a stepping or inching motor, d-c impulses are converted into 200 or 400 precise increments of one revolution of motor shaft. There is said to be no excessive inrush current when the Slo-Syn is turned on because starting and operating current are nearly identical. Rated input is 120 v, 40/70 cycles, single-phase and current is 0.3 amp maximum at 60 cycles. Bulletin SS459 gives details. The Superior Electric Co.

37—FLUSH STEEL DOOR has honeycomb core

Steel and kraft fibre, teamed with a modern adhesive, are combined in this unusually flat, flush door, the Series H-18. The kraft fibre part is a tough cellular core impregnated with phenolic resin. This honeycomb structure is sandwiched between two pans of 18-gage steel and bonded to them by a high-strength adhesive. The two pans are welded intermittently around the edges, the gap filled with polyester resin and the edges ground smooth to create a seamless door claimed stronger than intermittent-girder types.

According to manufacturer, the honeycomb system is fast and flexible and offers a means of providing advantages of so-called custom hollow metal doors in a wide range of low-cost standard items. Doors and frames come in many types and sizes with a variety of lights, louvered vents and other features. Doors made in this way offer exceptional evenness, it is stated. Adhesive bonding keeps the steel facings flat, and since there's no welding of internal stiffeners, there are no spots or heat-distorted areas. The doors are also reported extremely quiet in service, due to sound deadening properties of the kraft core. The Steelcraft Mfg. Co.

38—TACONITE OIL SEAL for use with gear units

This taconite oil seal is designed to prevent entry of taconite or other abrasive dusts and particles into the housing of Moduline gear units. An alemite fitting which remains stationary

One RUGGED Swivel Construction * for a whole range of CASTER DESIGNS

. . . assures dependable, low-cost materials handling

The 900 Series Caster and its variations—featuring *2 full rows of ball bearings* rolling in *2 separate, hardened enclosed raceways*, for easy swiveling, heavy gauge steel horn and top plate for extra strength—are examples of the variety and scope of the Faultless line. Whatever *your* material handling problem—Faultless, the "Complete Line" backed by nearly three-quarters of a century of caster-making experience, assures you the Caster to best do your job.

Faultless 900 Medium-Heavy Duty Caster

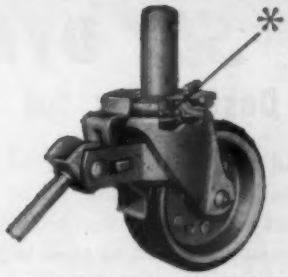
The 900 Series is a rugged, all-purpose Caster with Double Ball Bearing Swivel that out-performs the ordinary kind. Full drawn steel horn formed for surplus strength. Complete selection of wheels to suit floor surfaces, loads and operating conditions make it the ideal choice for use wherever high quality Industrial Casters are needed for medium-heavy duty applications.

Faultless 900GS Caster with Triple Grease Sealed Bearings

Dirt Can't Hurt It!

900GS combines dependable Faultless Double Ball Bearing Swivel construction with triple grease seals to give positive protection to swivel and wheel bearings wherever dirt, steam, chemicals are encountered—minimizes "down-time." Choice of hard and cushion tread wheels in sizes and capacities from 240 to 650 lbs. per caster.

Faultless C900 Scaffold Caster with Double Safety Locks



Protects Workers on Mobile Equipment

C900 Scaffold Caster combines an easy-to-use foot-operated brake lever which simultaneously locks both swivel and wheel and famous Faultless Double Ball Bearing Swivel construction—assuring safe and positive handling of mobile equipment holding workmen—making it the ideal caster for industrial, military and construction equipment.

WRITE FOR FREE LITERATURE

ASK YOUR DISTRIBUTOR Your nearby Faultless Industrial Distributor maintains a substantial inventory of Faultless Casters for immediate delivery. He and one of the strategically located Faultless Sales Engineers are available to work with you on every handling problem in your plant. Both are listed in the phone book Yellow Pages, under "Casters," and the Faultless heading.

Faultless Caster Corporation

Evansville 7, Indiana

Please send information on the following casters:

☐ 900 Series ☐ 900GS Grease Sealed ☐ C900 Scaffold

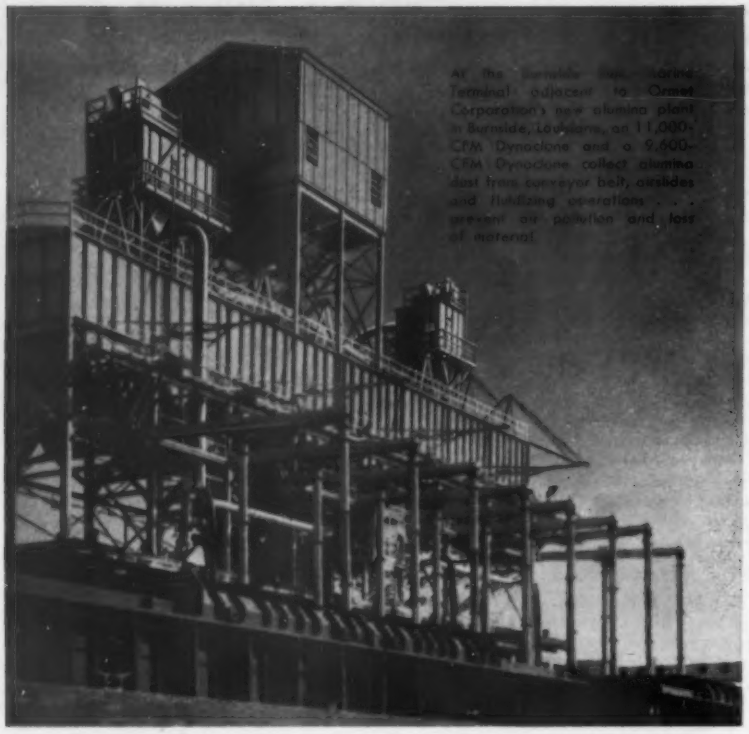
Name _____ Title _____

Firm _____

Address _____

City _____ Zone _____ State _____

For more facts circle 608 on Reply Card



Constant Suction! Complete Collection!

SLY DYNACLONE®

The Dust Filter for Continuous Processes

Just turn this dust filter on and forget it. The Dynaclone operates continuously, 24 hours a day. It maintains constant, uniform suction at dust sources, reclaims all the dust to prevent air pollution and damage to plant equipment.

The Dynaclone has *new* "Resist-O-Wear" filter bags (patent pending) that give as much as three times longer bag life . . .

It has a new roller cleaner for simplified automatic self-cleaning. Resilient rubber rolls form a positive dust seal as each row of bags is cleaned by atmospheric air drawn in by the main operating fan.

And it contains more cloth per cubic foot of filter than any other make . . . greater filtering capacity with smaller space requirements.

Learn the many reasons why the Dynaclone represents a new high in dust filter efficiency . . .

Send for 36-Page Catalog 104

SEE THE DYNACLONE in Space 73, the Chemical Show, New York Coliseum, Nov. 30-Dec. 4

SINCE 1875 SLY

THE W. W. SLY MANUFACTURING CO.

4600 TRAIN AVENUE • CLEVELAND 1, OHIO
OFFICES IN PRINCIPAL CITIES

OVERSEAS LICENSEE: ANDREW AIR CONDITIONING LTD., LONDON S.W. 1, ENGLAND

For more facts circle 609 on Reply Card

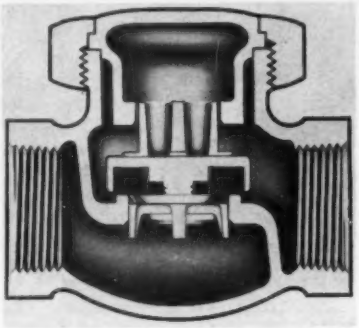
NEW PRODUCTS

(Begins on page 188)

even when gear shift is turning. Thus, grease in the seal can be replaced without stopping the machine. Grease is pumped through fitting and first enters cavity in the gear housing end plate in front of a dual-lip friction seal. Grease is then forced outward toward a rotating steel seal. Contaminated grease flows from the cavity through a 1/32-in. clearance between end plate and rotating seal. Maintenance personnel can inspect this clearance to determine if there is sufficient grease in seal. The Westinghouse Electric Corp.

39—BRONZE VALVES in globe, lift check types

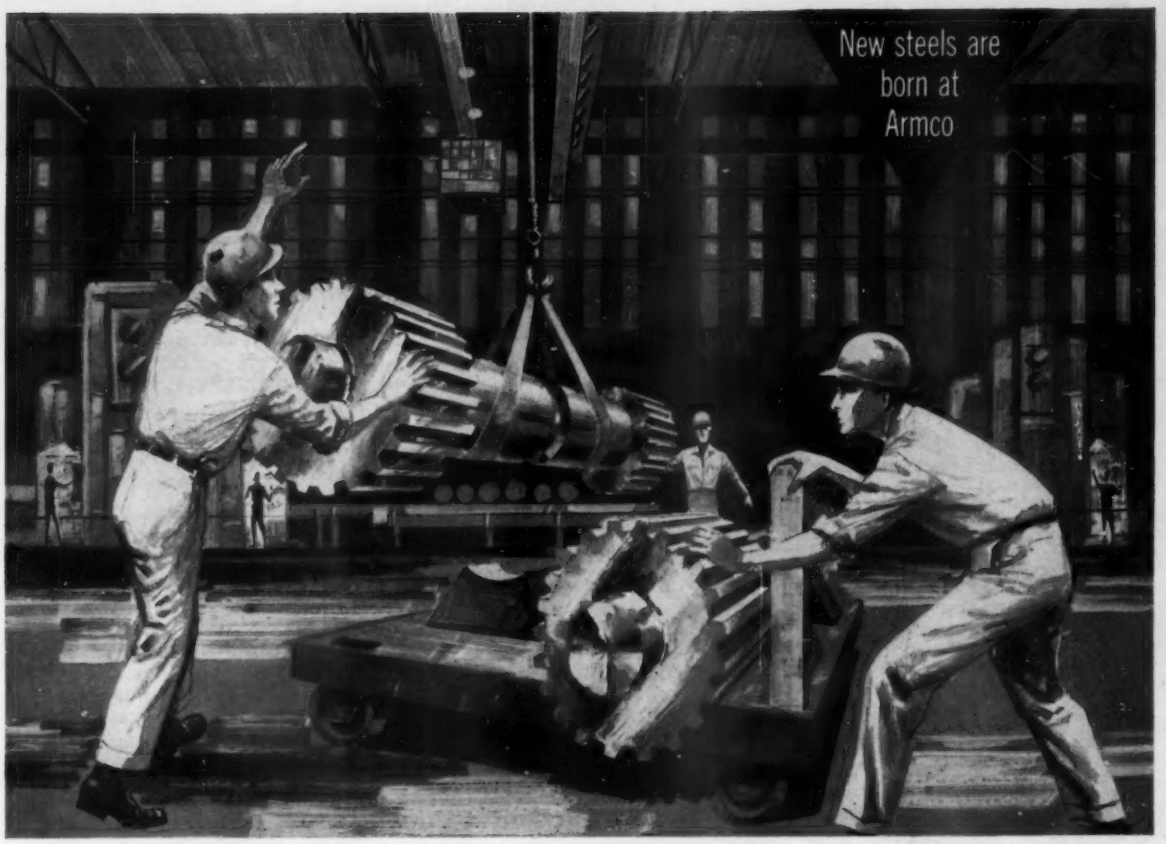
No. 229 C, a 200-lb bronze globe valve, and No. 239 C, a 200-lb bronze lift check valve (shown) are available in sizes from ¼ through 2 in. They replace company's former 212 A and 218 C valves. The new models have integral body seats with a semi-crown



face instead of the screwed in seats formerly used. The disc holder on the new globe valve is of slip-on type—no threaded disc stem ring. The slip-on disc holder speeds repair by insertion of a new composition disc or replacing of the disc holder and disc as a complete unit. The valves are regularly furnished with No. 4 Cranite discs, suitable for high pressure stem up to 450 F. When ordered for cold water, air, gas, oil, or gasoline, the valves are furnished with a No. 6 disc, a synthetic base composition soft enough to make a tight seat on air or gas, yet resistant enough to withstand hot water and wear of repeated operations. Crane Co.

40—ALUMINUM CASTERS for light duty applications

Series BS (swivel) and BT (rigid) are 5- and 6-in. aluminum casters with sealed bearings and 2-in. wide Neo-

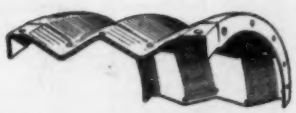


Production as usual, but...

20 FEET DOWN

they're putting in a new sewer

Installing sewers, conduits, and other underground structures by tunneling permits you to save the surface. Most of the work is underground—out of the way—and you maintain production and business as usual. What's the best way to tunnel? Armco Tunnel Liner Plates. Pound for pound they are the strongest made. Write for the Armco Liner Plate Catalog. Ask, too, about the Armco Construction Service that can provide Armco Liner Plate and other Armco Drainage Structures INSTALLED on a sub-contract basis. Armco Drainage & Metal Products, Inc., 7829 Curtis Street, Middletown, Ohio.



ARMCO DRAINAGE & METAL PRODUCTS

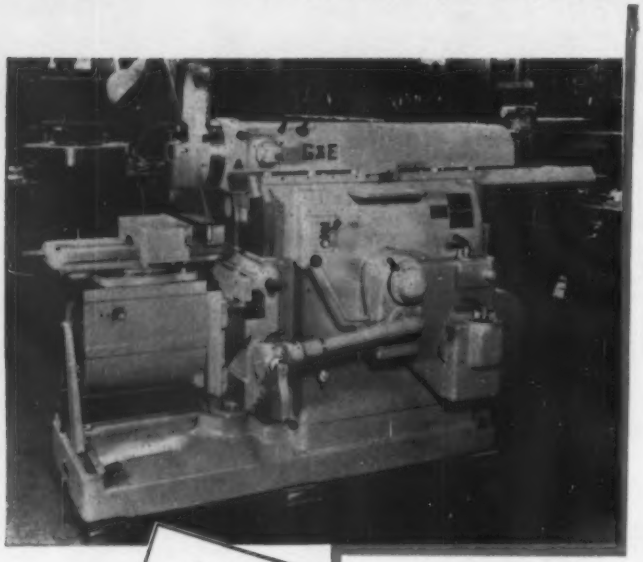
Subsidiary of ARMCO STEEL CORPORATION

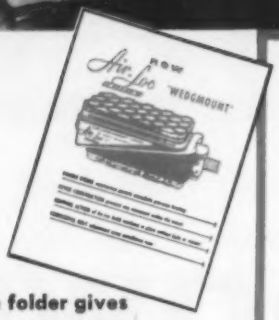
OTHER SUBSIDIARIES AND DIVISIONS: Armco Division • Sheffield Division • The National Supply Company • The Armco International Corporation • Union Wire Rope Corporation

For more facts circle 610 on Reply Card

Can You Hold Your Shaper Without Bolts?

YES- with new **WEDGMOUNT** which anchors **Shapers, Presses, etc.** *and* **permits precision leveling!**





This Gould & Eberhardt 24" Industrial Universal Shaper, operating at 120 cuts per minute with a 4" stroke, is installed without bolts on a new type machinery mount called WEDGMOUNT. A dial indicator at the base of the shaper showed a total oscillation of only .022" during operation, and no "walking." The 7,800 lb. machine is installed on six WEDGMOUNTS, each type 3" x 6" S. Before operation, precision leveling is achieved by simple adjustment of a bolt within each mount. Top and bottom of each mount is surfaced with patented "Air-Loc" pads, which provide the high degree of friction required to hold the machine in place despite its strong lateral thrust.

Free folder gives complete facts about WEDGMOUNT with—

- "Air-Loc" patented vinyl, sisal and cork pads top and bottom grip machines to floors
- double-wedge construction which permits immediate precision leveling
- keyed construction which prevents movement *within* the mount
- sizes available thru distributors, and prices

Air-Loc® WEDGMOUNT

write to... **Clark-Cutler-McDermott Co.**

115 West Central Street • Franklin • Massachusetts

For more facts circle 611 on Reply Card

NEW PRODUCTS

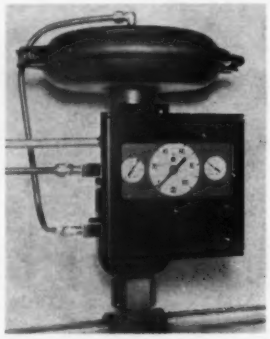
(Begins on page 188)

prene rubber tread wheels. They are suggested for use in packing, bottling and food processing plants, other applications where corrosive conditions prevail or where casters are regularly left outdoors. They incorporate corrosion resistant features of manufacturer's line of sanitary casters, including sealed wheel and swivel bearings, smooth horn surfaces. Bassick Co.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 287-288.

41—INSTRUMENT serves as controller, valve positioner

The Pilot Positioner is designed to combine—in one relatively low-cost, valve-mounted unit—the functions of an indicating pneumatic controller for temperature or pressure, and a "valve positioner" which amplifies air power for positioning of a pneumatic-operated control valve. By being close to the process and to the valve it controls, the Pilot-Positioner minimizes



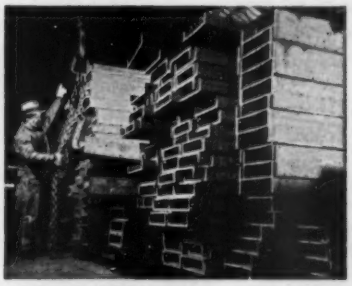
transmission lags, it is pointed out, and provides a high order of precision and speed in valve positioning. It can be mounted on many makes of diaphragm motor valves, or certain types of pneumatic operators and requires only one air supply.

Applications are expected to be primarily in the process and power industries, where valve may stick because of built-up deposits on the seat, where the valve stem is subject to friction, where large unbalanced forces act on the valve stem because of fluid pressure on the plug area of a single-seated valve. It is also suggested for use where a valve should respond to small changes in controller output air pressure, where a valve should respond rapidly, and where smaller valve

REPORT FROM RYERSON
on Services and Products in Stock

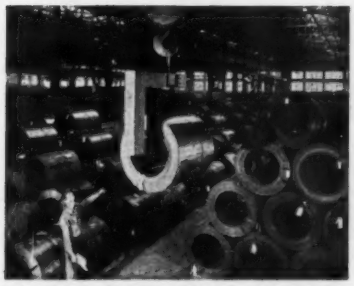
In spite of a heavy demand we are currently able to meet most requirements for all the steels listed below. In addition, a wide range of construction steel products, such as fabricated re-bars for reinforced concrete and post-tensioned assemblies for prestressed concrete, is quickly available. And there are also no shortages at all in service on aluminum, industrial plastics and metalworking machinery from your nearby Ryerson plant. See your red Ryerson catalog for the complete list—and call us when you need a single piece or a truckload.

CARBON STEEL & ALLOY BARS
Most complete range of types, shapes and sizes as well as largest tonnage.

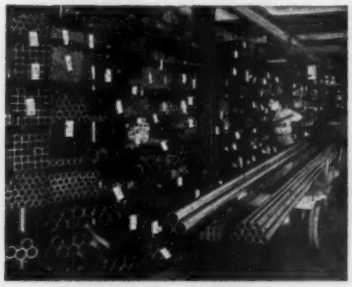


STRUCTURALS—I-beams, H-beams, channels, angles, tees and zees—all high quality steel to ASTM spec. A-7.

PLATES—14 types including special low carbon steel plates for forming and welding, leaded New E-Z-Cut, etc.

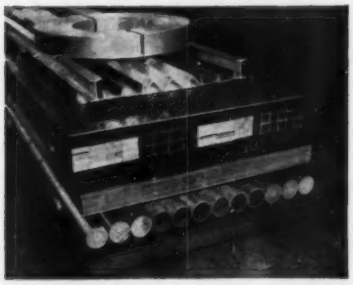


SHEET STEEL & STRIP—More than 20 different types in pattern sizes, cut-to-order sizes, strip coils, etc.



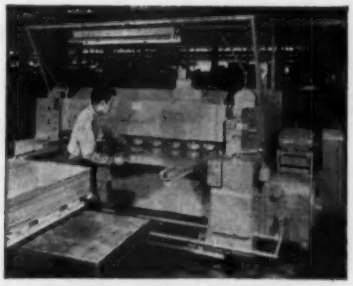
TUBING—Seamless and welded steel tubing—mechanical tubing, fluid line, pump cylinder and structural tubing.

STAINLESS STEEL—For immediate delivery. Over 2351 sizes, shapes, types, finishes: sheets, plates, bars, pipe, etc.



ALUMINUM—At many Ryerson plants—sheets, coils, plates, bars, tubing, architectural and structural shapes, etc.

INDUSTRIAL PLASTICS—PVC pipe, fittings, sheets and rods, rigid Kralastic and flexible polyethylene pipe.



MACHINERY & TOOLS—The broadest line of metal-working equipment available from a single source.

RYERSON STEEL®

Joseph T. Ryerson & Son Inc., Member of the INLAND Steel Family

STEEL • ALUMINUM • PLASTICS • METALWORKING MACHINERY
NATION'S MOST COMPLETE SERVICE CENTERS IN PRINCIPAL CITIES COAST TO COAST

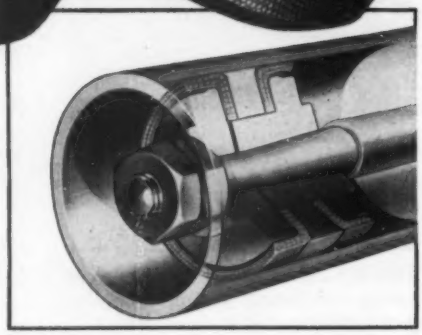
For more facts circle 612 on Reply Card

PUMCUP ADVANTAGES

now yours for

- HYDRAULIC CONTROLS
- AIR CYLINDERS
- RECIPROCATING PUMPS

Two common Pumcup types: conventional and 45° bevel type . . . available in a complete range of sizes and texture-engineered compositions.



Cutaway view of typical Pumcup installation resulting in prolonged high efficiency.

TAKE it from experienced users, Darcova Pumcups offer payoff advantages that can't be equalled! For example, they last many times as long as ordinary piston packing . . and they *hold peak efficiency* from start to finish. Because of the resulting production and maintenance economies, plant after plant is standardizing on Pumcups.

Improved application of the cup principle does the trick. And Darcova Pumcups are *texture-engineered* in *a range of compositions* to meet most temperature-pressure-fluid conditions. And they are available in sizes and types exactly right for your particular equipment.

It will pay you to get *all* the facts. Just ask for Pumcup Bulletin No. 5903.

DARLING VALVE & MANUFACTURING CO.
Williamsport 14, Pa.

DARCOVA
THE ORIGINAL COMPOSITION CUP
TRADE MARK
PUMCUPS

For more facts circle 613 on Reply Card

NEW PRODUCTS

(Begins on page 188)

topworks offer significant savings. U. S. Gauge Div., American Machine & Metals, Inc.

42—SPRAY GUN has dual component feature

Designed primarily for application of polyester resins where the accelerator mixture must be brought into contact with the catalyst mixture immediately before the mixture impacts the work surface, this two-headed spray

gun, Model 181, can also be put to other uses. An example is in spattering or veiling where two different materials can be sprayed with each pass of the gun. The gun can be used for almost any two-component finishing system where perfect mixing is not required, or where pre-mixing is impossible or impractical. The gun uses company's standard Model 18 gun nozzles. Gun body is drop forged aluminum and gun heads are ordinarily drop forged bronze, but stainless heads are available. Needle stroke is controlled at gun handle, and spray patterns may be regulated from round to fan. Binks Mfg. Co.

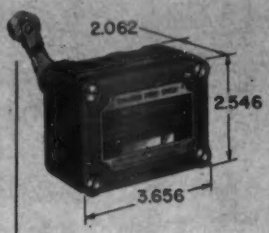
43—FELT INSULATIONS in wide range of densities

For use in high temperature industrial equipment, refrigeration systems, etc., B-E-H Spun Felts are available in densities from 3 to 8 lb per cubic foot and with a variety of surface facings. Made from spun mineral fibers with a phenolic resin binder, B-E-H Spun Felts can be used to insulate surfaces having temperatures from below zero to 450 F. If mechanically supported and enclosed, they may be used to 600 F. Lightweight and resilient, the material is claimed incombustible, non-corrosive and moisture resistant. It can be cut with knife or saw.

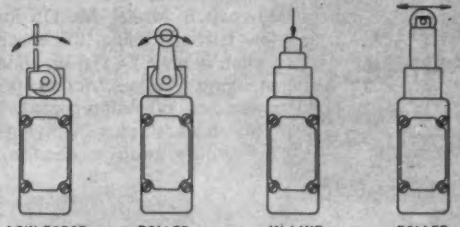
In the lower densities, this felt

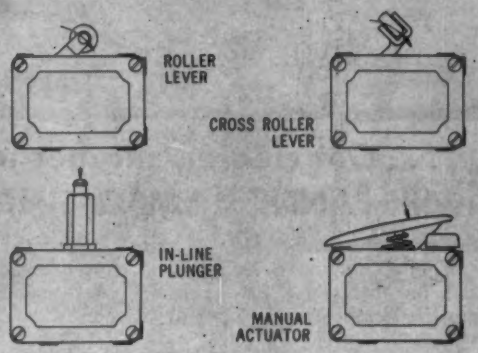
MICRO SWITCH Precision Switches

"ML-E1" SERIES
Give excellent protection in most industrial locations. Available in 4 actuator designs. Rated at 20 amperes.

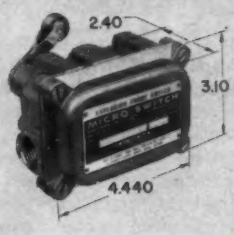


"EX" SERIES
Smallest explosion-proof switches available. Available in 4 actuator designs. Rated at 15 amperes.

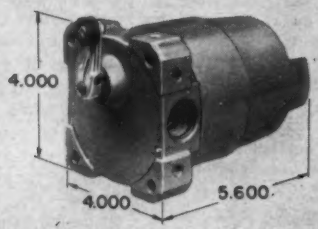




Dependable explosion-proof switches for use in hazardous plant locations



"EX1" SERIES
Two conduit openings—one at either end of the switch housing — permit through wiring, save cost and space.



"CX" SERIES
A weather-proof switch ruggedly housed to withstand outdoor conditions. Each of two SPDT switching units is operated by an opposite movement of the roller arm. Rated at 20 amperes.

These explosion-proof switches are ideal electrical controls in hazardous areas. They combine the ability to operate safely in explosive gas or vapor-air atmospheres with the desirable features of precise operation, accurate repeatability, small size, easy adjustment and durable construction. They are the most compact switches of this type available. All are Underwriters' Listed for Hazardous Locations Class I, Groups C and D; Class II, Groups E, F and G. (Send for Catalogs 83 and 84)

MICRO SWITCH explosion-proof switches are sold by distributors in key cities everywhere. See "Switches, Electric" in the Yellow Pages.

MICRO SWITCH . . . FREEPORT, ILLINOIS
A division of Honeywell
In Canada: Honeywell Controls Limited, Toronto 17, Ont.

Honeywell
MICRO SWITCH Precision Switches

For more facts circle 614 on Reply Card

CUT YOUR METAL TAG COSTS...

SINGLE OR QUANTITY RUNS CLEARLY EMBOSSED .008 GA. DUPLICATE METAL TAGS ARE EASY, FAST, ECONOMICAL WITH THE PANNIER SIMPLIFIED METHOD OF METAL TAG EMBOSSING

THE PANNIER CORPORATION
PITTSBURGH, PA.

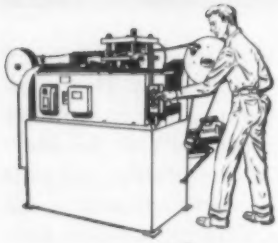
. . . Get clearer, sharper impressions, with PANNIER EMBOSSING MACHINES

Whether you use embossed metal tags in large, production quantities — or just a few, occasional tags — Pannier simplified embossing equipment is engineered to provide your metal tags at the lowest possible cost, greatest safety and easiest readability. Inexperienced help can operate any of the machines, large or small.

One to four tags at a time (model 344)

Model 344 Pannier Embossing Machine has two uses. It can emboss up to 4 duplicate tags, like that pictured above, in sizes up to 3" x 5½" or longer, at one operation (one letter at a time).

This same machine provides the low cost, matched male and female embossing matrices (shown at left) for use with Model 207. Paired, these two machines provide complete equipment for volume tag production.



Volume Tag Production (No. 207)

The Pannier Master Marker Embossing Machine, Model No. 207-H-6 automatically produces up to 60 duplicate tags per minute, employing coils of Pannier Safety Tag stock. These tags, in strip form, are nicked and notched for easy detachment from the coiled strip. Embossing impression is made by inexpensive male and female metal matrices—that cost only a fraction of type-and-matrix methods. The machine operates by start-stop pushbutton control. Fingers never approach the embossing area.

For single, occasional tags

Pannier engineering provides a wide range of Master Marker Embossing Machines to suit any quantity requirement. This small hand-held Embosser makes individual tags on half-inch strip metals or vinyl plastic.

Pannier Embossed Tags

You can order all your tag requirements from Pannier. They're embossed for you on these same machines. Tags are low cost and delivery service is fast. They can be made to your specifications, or write for standards and price list.

Write for literature or Pannier engineering service, specifying style and quantity of tags you require.

IDENTIFYING MATERIALS — MARKING DEVICES
THE PANNIER CORPORATION
801 PANNIER BUILDING PITTSBURGH 12, PA.
Offices: Los Angeles • Cleveland • Chicago • Philadelphia • Birmingham

PANNIER MASTER MARKERS FOR QUALITY

For more facts circle 615 on Reply Card

NEW PRODUCTS

(Begins on page 188)

insulation is flexible. Those of 4 lb and higher are semi-rigid. Coatings include black Kraft vapor barrier paper, Kraft paper and asphalt laminate, scrim reinforced aluminum foil laminated with flame-proof Kraft paper, aluminum pigmented vinyl film, embossed aluminum foil. Higher density types are also available with Neoprene coating. Thicknesses range 1 to 4 in. Baldwin-Ehret-Hill, Inc.

44—LIMIT SWITCH is small, heavy duty unit

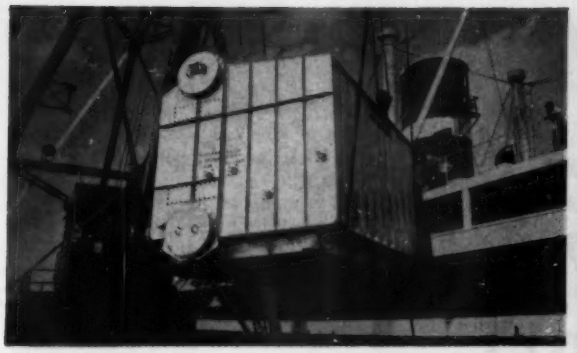
Rugged mechanical and electrical characteristics are claimed for the Loxswitch Model M. Of low mass, low friction design, this machine tool switch is only 1-7/16 in. wide by 3⅞ in. long. Major friction points are nylon or oil impregnated bearings. This feature plus a nylon-to-nylon heavy-duty latch mechanism is said

to result in an accurate switch mechanism capable of withstanding millions of actuations. Electrical load tests are reported to show operation beyond 45,000,000 cycles.

Loxswitch Model M is designed to fit existing layouts, comes in a plug-in style or for direct wiring, has a 600-v industrial rating. Extra wide contact gaps are designed to eliminate possibility of contact welding. According to manufacturer, an actuating force of only 45 oz will trip this switch; trip differential is short, 6 deg, while a safety overtravel of 50 deg is provided in both directions. The switch is available with three bases, including a flush mounting design, five lever styles in various lengths. Bulletin M-1 gives full details. The R. B. Denison Mfg. Co.

45—DUST COLLECTOR of improved involute design

The improved, involute design of the Type IC Cyclo-trell is reported to permit high efficiency collection of abra-



▲ A C-E Package Boiler, Type VP, en route to Europe. This boiler type is available with capacities from 4,000 to 90,000 lb of steam per hr, with pressures to 700 psi and temperatures to 750 F in certain sizes. It is designed for oil or gas firing. Several hundred of these units are now in service.

▲ A shop-assembled Controlled Circulation Boiler, Type PCC, being prepared for shipment. This type unit is available with steam capacities from 80,000 to 120,000 lb per hr, and with pressures and temperatures to 1000 psi and 900 F. For special applications, designs are available to provide higher steam pressures and temperatures. Seven PCC Boilers are now in service.

▲ A shop-assembled C-E High-Temperature Water Boiler, Type HCC, being unloaded at a midwest manufacturing plant. It is one of two 12-million-Btu boilers used for plant heating. Available for capacities from 10 million to 300 million Btu, this unit type is shop-assembled in sizes up to 50 million Btu for oil or gas firing — up to 40 million Btu for coal firing. Currently, more than 50 HCC Boilers are in service or on order.

NOW

C-E offers LARGER SHOP-ASSEMBLED BOILERS

Three service-proved designs with capacities to 120,000 lb per hr . . . pressures to 1000 psi . . . temperatures to 900 F

The economies inherent in shop-assembled boilers can now be yours even if your steam requirements are as high as 120,000 lb per hr. The C-E line, consisting of three basic unit types, has been expanded to include pressures, temperatures and capacities well beyond normal package-type limits.

The standard, natural-circulation, ***C-E Package Boiler —Type VP***—is now available with capacities to 90,000 lb per hr, and with pressures and temperatures to 700 psi and 750 F.

Where greater steaming capacity is required, or where higher pressures or temperatures are needed for industrial processing or power generation, the shop-assembled ***C-E Controlled Circulation Boiler—Type PCC***—is available. It is designed for the 80,000-to-120,000-lb capacity range, with pressures to 1000 psi and temperatures to 900 F. For special applications, this unit is also available for considerably higher pressures and temperatures.

The C-E High-Temperature Water Boiler—Type HCC—is an ideal type for large space-heating and certain process uses. It is also available in shop-assembled form for capacities to 50 million Btu per hr. It is designed for pressures to about 500 psi, and can provide water at 450 F or higher.

The new, high-capacity ranges of these shop-assembled units represent the logical evolution of familiar and successful designs that have been proved in service for quality, economy and performance.

Catalogs on any or all of these units available on request.

COMBUSTION ENGINEERING

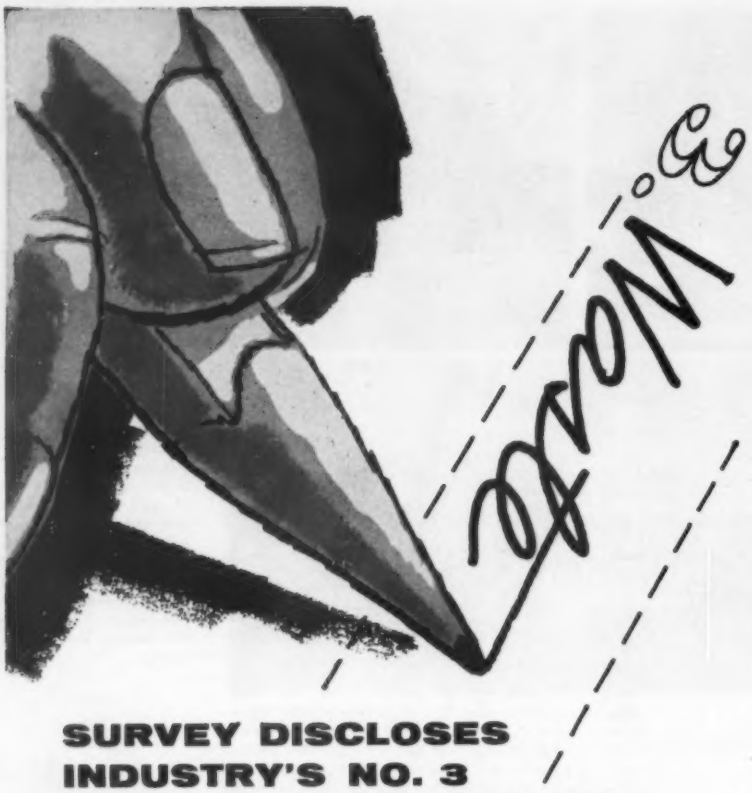
C-E

C-202A

Combustion Engineering Building
200 Madison Avenue, New York 16, N. Y.
Canada: Combustion Engineering-Superheater Ltd.

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE

For more facts circle 616 on Reply Card



SURVEY DISCLOSES INDUSTRY'S NO. 3 SKIN HYGIENE PROBLEM: WASTE SOAP

Here's The Answer To It From SBS

The most difficult three industrial skin hygiene problems, as rated by 2,177 major plants recently surveyed, are:

1. *SKIN DISEASE*
2. *REMOVAL OF TOUGH SOILS*
3. *WASTE OF SOAPS*

Closely associated with the actual problem of skin disease is the costly waste of soaps in *all* plant areas. Liquid soaps run off hands too easily, other types melt or spill. Where wasted soap accumulates, extra housekeeping expenses are involved, sub-sanitary conditions exist and worker dissatisfaction mounts. Often the combined cost of soap waste and resulting maintenance can add up to more than the original cost of the soap supply. Small wonder industry rates it as such a problem!

What's the answer to it? Ask an SBS representative to show you "Operation Pinpoint", 10 minute sound slide digest of the national survey, and you'll see how a *planned corrective program* can solve all these skin hygiene problems. Since SBS produces a *complete range of cleansers*, he can suggest the right cleanser for each job. For the safest, savingest answer to skin disease, tough soils, and soap waste, write today . . . Dept. 3J.

the washword of industry

SBS sugar beet products co.

SAGINAW, MICH. • Los Angeles, Calif. • Newark, N.J

CANADA: Chemical By-Products, Ltd., Toronto, Ontario

For more facts circle 617 on Reply Card

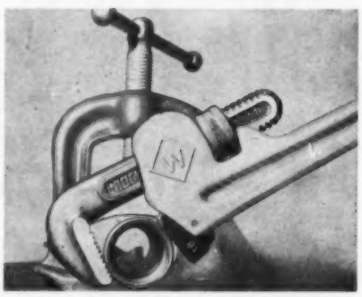
NEW PRODUCTS

(Begins on page 188)

sive or heavy dust loadings as found in steel sintering, petroleum refining, chemical and cement plants. According to manufacturer, virtually any size job can be handled through the variety of arrangements possible with these mechanical dust collectors. Catalyst dust suspended in reactor effluent and regenerator flue gases from the fluid catalytic cracking process may be collected, it is pointed out, and followed by a 24-in. Cyclo-trell with steel mesh liner (Type C24L) and an electrostatic precipitator, the combined units remove even finest residual catalyst particles. To handle abrasive dusts, the involute type collectors can be fitted with steel mesh liners incorporated with castable cements. Bulletin 300 gives further information. Research-Cottrell, Inc.

46—PIPE WRENCH is self-adjusting, 10- to 24-inch sizes

This wrench features a sliding lower jaw designed to automatically tighten its grip as more force is applied. It won't slip, company states, yet instantly releases on the backstroke for



easy removal even in close quarters. According to manufacturer, the sliding jaw automatically takes up the slight variations of adjustment resulting from rough handling, and the jaw in its extended position gives increased leverage and better grip on irregular shapes. Wheeler Mfg. Corp.

47—LIQUID dries out, moisture proofs electrical equipment

Application of CRC Moisture Inhibitor is claimed to eliminate harmful effects of moisture in electrical equipment—to drive out absorbed moisture and keep it out. Electrical characteristics, which deteriorate in moist and humid atmospheres, are restored by this treatment, says manufacturer; and even totally submerged equipment can be put in operation quickly. Although non-conducting, CRC does not inter-

EXTENDS BATTERY LIFE 25%-AT NO EXTRA COST!

the new

gould

SILCONIC

plate

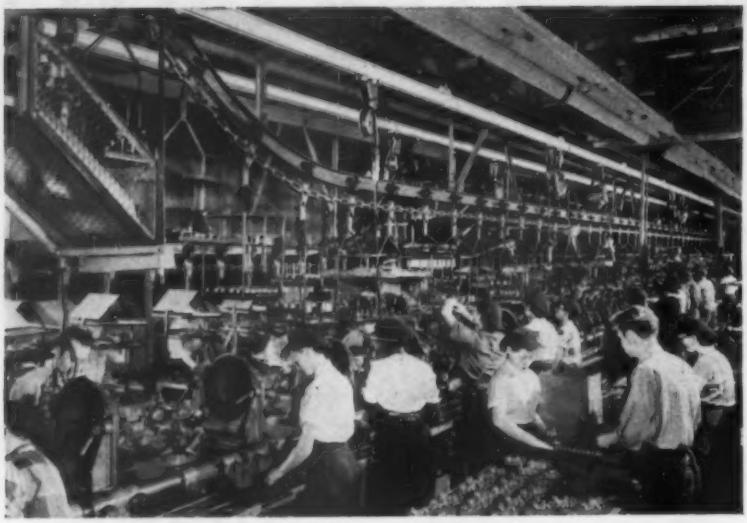
IN ALL MOTIVE POWER BATTERIES

Write for catalog GB-1876
GOULD-NATIONAL BATTERIES, INC.
Trenton 7, New Jersey

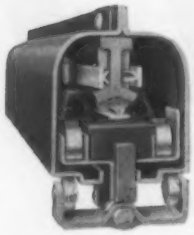
For more facts circle 618 on Reply Card

FEEDRAIL®

keeps production on the move



...because it moves with production



Feedrail systems (60 to 500 amperes) keep production moving throughout industry — provide convenient movable power sources for:

- Cranes and Hoists
- Production Lines
- Conveyor Assembly Lines
- Moving Test Lines
- Portable Tools
- Machine Tools
- Cutting and Sewing Rooms
- Lighting
- Motor Control
- Business Machines

Eliminate the dangerous, time-wasting "cable clutter" of old-fashioned production lines – and you've gone a long way to speeding up production.

Feedrail "moving power systems" do this by feeding power to portable tools and other electrical equipment through *overhead mobile outlets.*

Power is available instantly anywhere along the line. Long, dragging cables that hamper production are eliminated. Employees can move about in complete safety.

Result: *faster, safer production.*

An added plus is that Feedrail never becomes obsolete. If production requirements change, Feedrail can be relocated or extended with surprising ease and speed.

Find out what a difference Feedrail can make in your plant production. Get all the details. Write today to Dept. P-10.

SOLD BY MORE THAN 1,000 ELECTRICAL DISTRIBUTORS FROM COAST TO COAST

972

ELECTRIC FEEDRAIL®

Never Becomes Obsolete

FEEDRAIL CORPORATION

Subsidiary of Russell & Stoll Company, Inc.

125 BARCLAY STREET • NEW YORK 7, N. Y.

SPECIALLY QUALIFIED REPRESENTATIVES IN PRINCIPAL CITIES

For more facts circle 619 on Reply Card

NEW PRODUCTS

(Begins on page 188)

fere with conductivity of contacts or commutators, it is pointed out, and it prevents corrosion of metals with a continuous molecular film that blankets the surface. Immersion, pouring, brush or spray methods can be used with this liquid, and under most conditions an application gives a year's protection. Corrosion Reaction Consultants, Inc.

48—FORMABLE PACKING serves many applications

Lonsor is described as a metallic packing suitable for high pressures and temperatures which never needs replacement since it doesn't deteriorate or harden. Lonsor comes in 1-lb cakes. You break it off and stuff into

the box, gland or shaft by hand. Its inherent self-lubricating properties, derived from its antimony content, result in frictionless running, according to manufacturer, and because of its pliability, it compensates for inequalities in worn or out-of-round shafts. Acid free itself, its lead base renders it impervious to acids with which it comes in contact, company points out; it withstands high pressures and temperatures to 700 F and is impervious to water, steam, acids or oils. Lonsor costs less than $3.50 a pound. Newage Industries, Inc.

It's easy to obtain product data with the postage-free Reader Service Card provided on pages 287-288. Use them for information on advertising products, too. Just circle the key number appearing at bottom of the ad.

49—ELBOW FANS with capacities to 32,000 cfm

These packaged elbow fans are suggested for general ventilation and for use with furnaces, dryers, ovens, plating and pickling tanks. Standard units

For more facts circle 620 on Reply Card ——→

You *know* this plastic daylighting panel retards fire

With this panel, you're sure.

The labels tell you it is safer . . . has passed the down-to-earth, industry-accepted tests that let you specify it with confidence.

It won't support combustion—can't contribute to spread of a blaze. That's why it is *right* for a school . . . a factory . . . a hospital—any place where code requirements are stiff and safety is a must.

It's safer because it is made with Hetron®, the inherently flame-retardant polyester plastic which we make. You can get colorful, non-shattering Hetron panels and flat panes from any leading fabricator of polyester glazing material. For safety's sake, be sure to specify "Hetron" or "fire-retardant grade." It costs a little more . . . and is worth it. For names of fabricators who can supply you, write us.

DUREZ PLASTICS DIVISION

HOOKER CHEMICAL CORPORATION

3910 WALCK ROAD, NORTH TONAWANDA, N.Y.

HOOKER CHEMICALS PLASTICS

Where good visibility means safety...

Specify BLAW-KNOX Electroforged® Steel Grating

A primary function of open flooring is to admit light and air to areas above and below its surface . . . to provide safer, more comfortable working conditions. Blaw-Knox Electroforged Steel Grating is designed to provide maximum open area.

Load requirements establish equal bearing bar dimensions for all types of grating, in equal service. Because it is Electroforged, Blaw-Knox grating can get maximum strength from crossbars only ¼ inch square. This means less obstruction to light and air, and safer, more comfortable working conditions above and below.

Visibility is only one way Electroforged grating increases safety. Sure footing is provided by the non-slip, twisted crossbar and a choice of either square, or serrated bearing bars. Electroforged grating is self cleaning, too. There are no joints or crevices to collect dirt and grease.

For more information on how to specify the Blaw-Knox Electroforged Steel Grating best suited to your needs, write for Bulletin 2527-R.

BLAW-KNOX

BLAW-KNOX COMPANY

Blaw-Knox Equipment Division
Dept. H, Pittsburgh 38, Pennsylvania

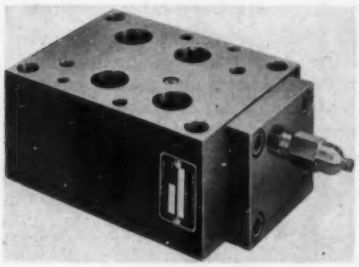
For more facts circle 621 on Reply Card

(Begins on page 188)

are designed to handle clean or slightly contaminated air or fumes at temperatures to 750 F; special construction is available for corrosive or explosive conditions. Installed in ductwork, the unit is said to occupy only slightly more space than a standard elbow. An adjustable-pitch V-belt drive permits field adjustment of capacity to suit conditions. For wider capacity variation, sheaves and even motors and fan wheels may be interchanged. It is noted that motors, available in any type of enclosure, are not exposed to hot or contaminated air or fumes, and that bearings, located in an insulated shaft tube, are cooled with outside air and lifetime lubricated. Motor and fan assembly can be removed without disturbing ductwork connections. Five basic sizes cover capacities from 600 to 32,000 cfm. L. J. Wing Mfg. Co.

50—RELIEF VALVE requires no piping

No piping is required for the Model BTP-175, a relief valve in the Circuit-Stak series of pipe-less hydraulic valves. It is installed in the circuit

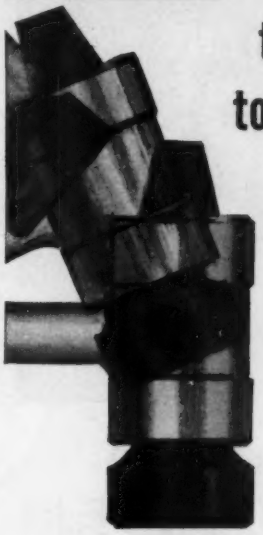


by being sandwiched between a ¾-in. gasket-mounted four-way valve and the sub-plate, or manifold. Stacking of circuit components in this manner eliminates inter-connecting pipes, it is pointed out, and reduces the size of the valve panel required. Savings up to 50 per cent over conventional mountings are claimed. Double A Products Co.

51—VERTICAL CONVEYOR handles 20 cases a minute

This index-type case vertical conveyor is designed to automatically receive, space, transport and discharge individual packages at a rate of up to 20 cases per minute. It handles either one or two packages per carrier at a vertical speed of 90 fpm, and occupies only 4-by-4 ft of floor space plus 2¼-by-2 ft for automatic feed belt. It permits handling a variety of pack-

COUNT ON SHURE-SET



the "power-concentration" tool that revolutionizes light fastening!

With Shure-Set's unique "Power Transfer" design, you can drive pins and threaded studs right through light-gauge metal into concrete with a few strokes of a hammer. The hammer-driven Shure-Set light fastening system is ideal for carpenters, plumbers, electricians, builders, and maintenance personnel for quick, reliable fastening into steel, concrete, or building block... no drilling or cartridge required.

Shure-Set supports the fastener until it is driven home . . . no duds, no bent studs or pins, no smashed thumbs. Try Shure-Set and you'll save time, money, and temper while doing a better job. Look for your Shure-Set dealer under "tools" in the yellow pages.

In addition to hammer-in Shure-Set, the versatile Ramset Fastening System includes Ramset powder-actuated method for heavier fastening, and Ringblaster® heavy-duty kiln gun.

OLIN MATHIESON CHEMICAL CORPORATION Shure-Set®

Ramset Fastening System

WINCHESTER-WESTERN DIVISION • OLIN MATHIESON CHEMICAL CORPORATION
294-J BEREA ROAD • CLEVELAND 11, OHIO

For more facts circle 622 on Reply Card

One or Two Coats of Subox Give The Protection of Three of Ordinary Paint

As the only American paints made with *lead-suboxide,* Subox paints provide extraordinary protection to metal surfaces. Unlike inert pigments, *lead-suboxide* is chemically active. That means Subox works continuously to combat corrosion.

Two coats of Subox usually will give the protection of three of standard paint, and frequently but one coat is enough.

Even under severe conditions, Subox paints do not crack, chip or blister. Eventual repainting costs are cut to a minimum because *lead-suboxide* establishes a dense, metallic lead film which can be recoated without expensive scraping, sanding or repriming.

Anti-corrosive Subox paints are available in a wide selection of colors—dark and light.

Write for a copy of "Plan Painting of New Plants to Reduce Costs."

SUBOX PAINTS

Subox Inc.

Established 1924

19 FAIRMOUNT PLANT

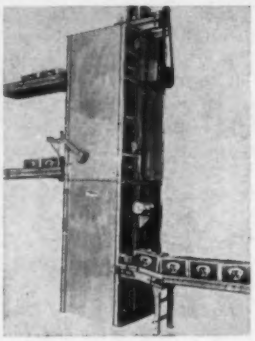
Subox Company of Canada—Weston, Toronto 15

For more facts circle 623 on Reply Card

NEW PRODUCTS

(Begins on page 188)

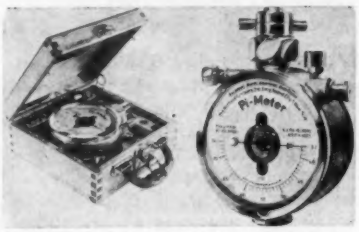
ages from 10 to 15½ in. wide, 12 to 36 in. long, 7 to 15 in. high, and up to 180 lb per carrier. Self supported



and floor mounted, this conveyor has removable light weight protective enclosure sections. Hinged doors allow for two or more discharge levels for packages leaving the unit. A push-button arrangement permits change from a one-package-per-carrier operation to a two-package system. Alvey Conveyor Mfg. Co.

52—PERFORMANCE METER for multi-cylinder engines

For rapid adjustment and balancing of cylinder loads of multi-cylinder diesel, gas, steam and gasoline engines, the Pi-Meter can be attached to a cylinder's pressure tap. This simple instrument reads time-averaged pressure which is related to indicated mean effective pressure. Since this pressure



(psi) is read directly on the meter's dial while the engine is running, it can be used by non-technical personnel. Five springs within the Pi-Meter accommodate a wide enough pressure range to adapt it for use with any type of reciprocating engine.

The Pi-Meter has no upper speed limit (lower limit is 80 rpm) and is therefore especially useful in determining power output of high speed engines, once a chart has been plotted relating to the instrument's reading to the mean effective pressure of the engine. For continuous operation, the

This is for YOU!

Shows you why Clarage's airfoil fan tops all others where it counts...on-the-job

Stable high efficiency where it counts — under actual operating conditions.

That's what you *get* (not just expect to get) with the Clarage Type AF Dynafoil Fan...perfected for mechanical draft and heavy-duty applications such as industrial processes, conduit type air conditioning, tunnel ventilation.

Contact our nearest sales engineering office or request catalog on coupon at right.

Clarage Fan Company
Kalamazoo, Michigan

Please send me Catalog 859 describing Clarage Dynafoil Fans.

Name_____

Firm_____

Address_____

City_____ State_____

For more facts circle 624 on Reply Card

IT WOULD TAKE UP TO

7 Men with 7 Brooms

TO KEEP UP WITH THIS

NEW POWER SWEEPER!

COMPACT design and easy steering make the new Tennant Model 53 Power Sweeper ideal for fast and efficient sweeping of both congested and open areas.

● Riding this new TENNANT Power Sweeper and cleaning a 40" path on the run, one man can sweep *3 to 7 times faster than is possible by hand!*

Combined brush-and-vacuum system of the new TENNANT "53" instantly removes chips, sand, debris, dirt and dust that push-brooms can't pick up.

Starts, stops, reverses instantly *without hand shifting.* Easy to use, easy to buy . . . often pays for itself in 9 to 14 months!

WRITE TODAY *for illustrated bulletin, photos and performance data. G. H. Tennant Co., 771L N. Lilac Drive, Minneapolis 22, Minnesota.*

OUTSTANDING "53" FEATURES

- Sweeps 40" path (with sidebrush)
- Toe-tip shifting leaves both hands free for steering
- Has front wheel drive, rear wheel steer. Turns in 5' radius
- Works easily in congested areas
- Powerful vacuum, large filter gives extra-clean sweeping
- Both gas and LP-gas models

TENNANT

Industry's Most Widely Used

POWER SWEEPERS

Model 100 Sweeper cleans 7'4" path

Model 80 Sweeper cleans 53" path

Model 40 Sweeper cleans 34" path

SPECIALIZED MAINTENANCE EQUIPMENT

For more facts circle 625 on Reply Card

NEW PRODUCTS

(Begins on page 188)

Pi-Meter can be water-cooled through a threaded connection. For lubrication of piston contact surfaces during operation, the instrument incorporates a hand pump with check valve. The Korfund Co., Inc.

53—DACRON UNIFORMS are practical, look sharp

This attractive slacks-blouse combination, priced under $14.00, is one of three industrial uniforms specially designed for women who work where super-clean, dust-free conditions are

essential. The line also includes a dress (available in several colors) and a laboratory coat and all are made of lint-free acid resistant Dacron, said to greatly outlast comparable clothing made of cotton or wool. Other features announced for the Dacron uniforms include resistance to grease, oil, paint and abrasion, easy laundering and quick drying. The blouse and slacks come in a tan herringbone weave. Worklon, Inc.

54—TINNING METHOD coats metal surfaces quickly

Tin Swipe is a sponge impregnated with tinning metals, chemical cleaners and a flux. When the tin is wiped across a heated metal surface, it leaves a smooth coating of tin, says manufacturer, and you don't have to prepare the surface beyond wiping off accumulations of dirt and grease. A practical method of application is to

STEAM

AIR

OIL

WATER

lever acting

direct acting

piloted piston

if it flows...

THERE'S A GENERAL CONTROLS SOLENOID VALVE TO CONTROL IT!

Oil, gas, water, steam, corrosive fluids, refrigerants–makes no difference what you're handling... General Controls has a solenoid valve to do the job. The General Controls line is *complete*... pressure range from 0 to 3000 psi in normally open, normally closed, shut-off, 3-way and 4-way valves.

And this *single reliable source* can save you time and money... by delivering a quality product–backed by factory-trained field service representatives where and when you need them. Call on the man from General Controls for help in solving your automatic control problems.

Nine plants... 44 factory branch offices at *your* service.

diaphragm

GENERAL CONTROLS

Automatic Controls for Product or Process

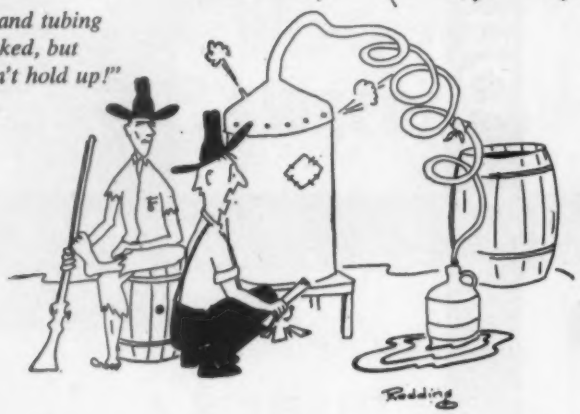
Glendale, Calif. · Skokie, Ill. · Guelph, Ontario, Canada

Nine Plants — 44 factory branch offices
serving the United States, Canada and Western Europe

For more facts circle 626 on Reply Card

Life in these excited states...

"I got the pot and tubing corrosion licked, but now the jugs won't hold up!"

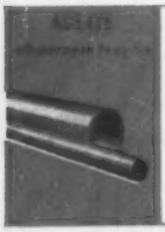


Highest pumping efficiency, with faultless corrosion resistance. Hard rubber casing and impeller; Hastelloy *C* shaft. 80 gpm. *Bul. CE-55.*

Still bothered by corrosion?

Downtime, ruined equipment, endless repairs are more than disturbing... they're expensive too. You can put an end to 85 to 100% of your corrosion and contamination losses by specifying chemical-resistant Ace rubber and plastic equipment... pipe, valves, tanks, pumps. American Hard Rubber Company's 108 years of experience is ready to help you with any problem.

Liquids never touch metal in Ace diaphragm valves! Rubber or plastic-lined cast iron, or solid plastic bodies. Sizes ½ to 6". Ask for facts.



High-impact, rubber-plastic, most economical for average chemicals. ½ to 6". Screw or solvent welded fittings. Valves ½ to 2". NSF-approved. *Bul. 80A.*

All-purpose rigid PVC. Sched. 40, 80 & 120, ½ to 4". Threaded or socket-weld fittings. Valves ½ to 2". NSF-approved. *Free Bul. CE-56.*

See our pages in CEC Catalog!

ACE

...rocessing equipment of rubber and plastics

AMERICAN HARD RUBBER COMPANY
DIVISION OF AMERACE CORPORATION
Ace Road • Butler, New Jersey

For more facts circle 627 on Reply Card

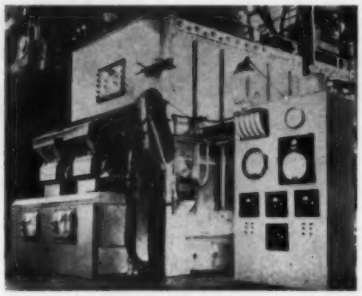
NEW PRODUCTS

(Begins on page 188)

first wipe the pad across the metal and then apply heat. For a heavier coating of tin, you make a second wipe of the sponge while the metal is still hot. Wright Mfg. Co.

55—STEAM GENERATORS, coal fired packaged units

This line of generators affords an economic choice of packaged steam and power supply in coal fired units of substantial capacity. They are avail-



able in standard sizes of 43,000, 50,000 and 63,000 lb of steam per hour with pressures to 250 psi. One of the water-tubed units now under test is reported to have operated continuously at 54,000 lb per hour with efficiencies of more than 80 per cent. Advantages announced include flexibility, smokeless operation, variety of fuels, semi-automatic operation, and changeover from coal to oil in 7 hr. Bulletin PG-59-4 gives performance data. Foster Wheeler Corp.

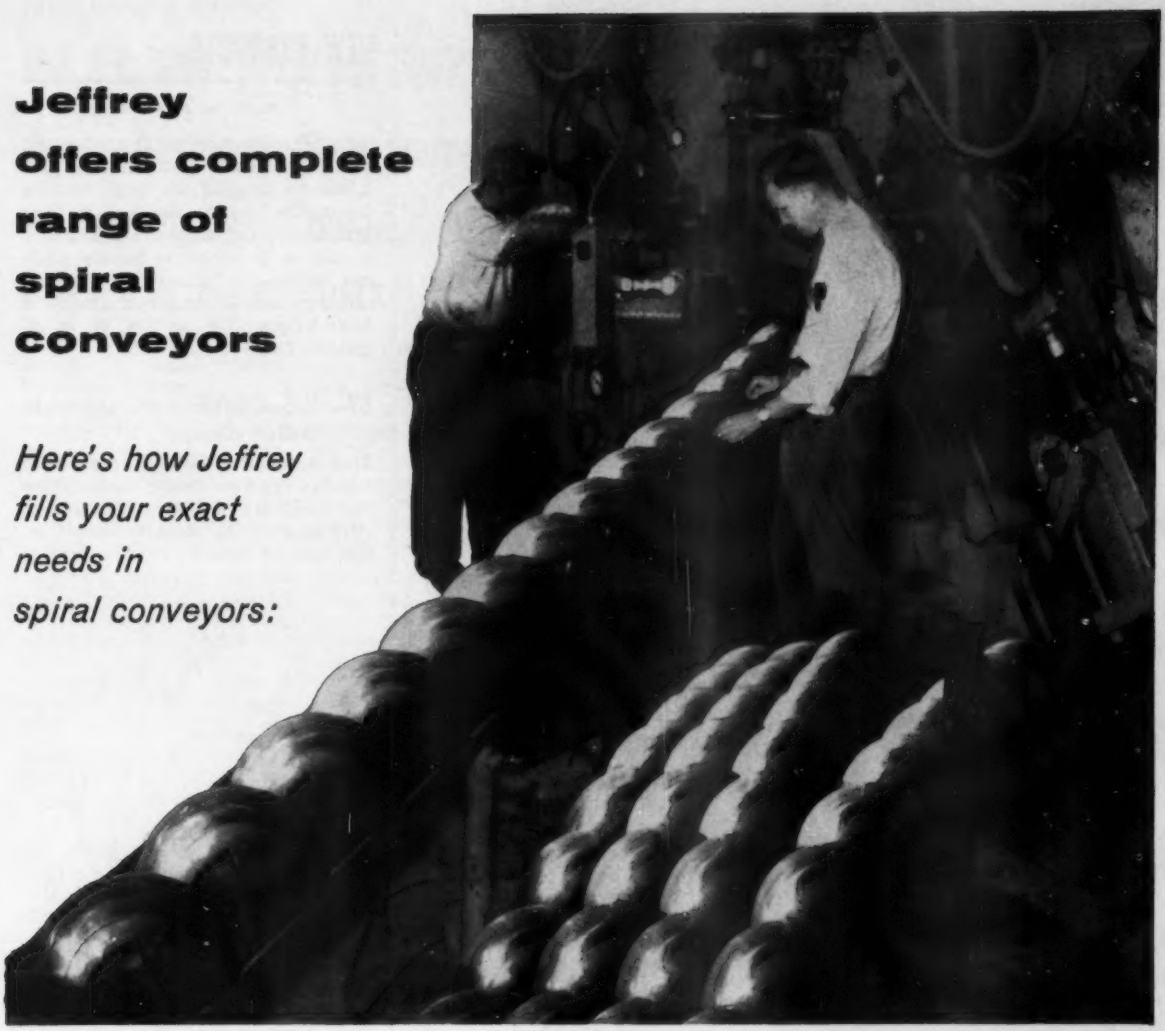
Reader Service Cards on pages 287-288 make it easy to get further information on any of these products. Just circle the item numbers of the products you would like to know more about.

56—FIRE HOSE, super strength, wears longer

Ambassador, a double-jacket 600-lb test fire hose has both outer and inner jackets of strong, resilient Dacron polyester fiber. To give still greater strength and wear resistance to this hose, the two jackets are permanently "rubber bonded" together, to prevent rubbing or slipping against each other to cause concealed wear. With an extruded synthetic tube claimed freeze-proof down to —65 F, this hose is announced as offering maximum re-

Jeffrey offers complete range of spiral conveyors

Here's how Jeffrey fills your exact needs in spiral conveyors:



- Complete range of types—sectional spirals, ribbon conveyors, cut flight conveyors, short pitch conveyors, double flight conveyors—all in a wide range of diameters and thicknesses.
- Stock is maintained on all widely used types, permitting Jeffrey to make fast shipment.

Standard conveyors are made in mild or abrasive resistant steels. Where heat-resistance or corrosion-resistance is required, you can select Jeffrey spirals in stainless steel, brass, Monel, aluminum, or other special metals.

With Jeffrey spiral conveyors you get a complete selection *plus* extras in quality—precision fit, smooth flight surfaces and non-toxic protective coating. For full information write for Catalog 951. The Jeffrey Manufacturing Company, 905 North Fourth Street, Columbus 16, Ohio.

Centrifuge cake ranging from 62 to 67 per cent solids are transferred to a mixer by a 16" diameter Jeffrey Spiral Conveyor at the lime reclaiming plant of the City of Lansing, Michigan.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT...TRANSMISSION MACHINERY...CONTRACT MANUFACTURING

For more facts circle 628 on Reply Card

reputation for dependability

THERE'S A REASON why more and more Motorpumps are being specified today in all types of industry:

Only the Ingersoll-Rand Motorpump combines proven features with modern design engineering that provide rugged dependability, highest pumping efficiency. Motorpumps give you ease of installation, low cost operation and minimum maintenance.

To meet your particular requirements, Motorpumps are available in the widest range of sizes and types. Capacities go from 5 to 2800 gallons per minute; heads to 650 feet. Write today for the latest bulletin.

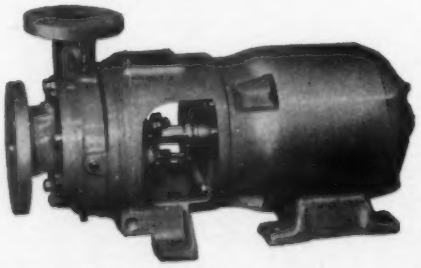
Ingersoll-Rand

9-828 11 Broadway, New York 4, N. Y.

Ingersoll-Rand

MOTORPUMP

From ¼ hp to 75 hp



For more facts circle 629 on Reply Card

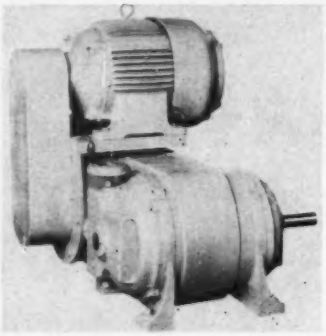
NEW PRODUCTS

(Begins on page 188)

sistance to effects of mildew, abrasion, water, chemicals. Manufacturer says it can be dragged for miles without fraying, or stored away soaking wet without fear of mildew. Ambassador is said to be easier to handle when wet because of the low water absorbency rate of Dacron. It comes in 50-ft lengths, 1½ or 2½ in. in diameter. The Fyr-Fyter Co.

57—V-S DRIVE with separate motor design

This mechanical variable speed drive features separate motor construction and horizontal assembly. Advantages attributed to the separate motor design include meeting of J.I.C. stand-



ards; compactness, due to the "piggyback" construction; and wide selection of infinitely variable output speed ranges realized through proper selection of V-belt and timing belt. Dripproof, totally enclosed, explosion motors are available; ½ through 30 hp; output speeds from 4660 to 1.2 rpm; speed variations from 2:1 to 10:1. Sterling Electric Motors, Inc.

58—TREATED WOOD resists acid or alkali attack

Kofural Impreg, for use in fabrication of certain processing equipment, is a lumber base, impregnated with a monomeric solution of furfuryl alcohol and a catalyst. It can be had in fabricated shapes or in usual lumber forms, for fabrication with standard wood-working tools. According to manufacturer, the vacuum-pressure treatment which incorporates the resin with the wood utilizes the small molecular size of the resin to obtain penetration of the wood structure, including cell walls; after polymerization to a thermoset resin it is immune to electrolytic or galvanic corrosion. The resultant product is described as resistant to acid and alkali attack, and

FROM GENERAL ELECTRIC . . .

NEW *Polyseal** *Insulation Systems*

• Sealed Against Contaminants

• Help Cut Motor Costs

MOTOR SAVINGS OF UP TO 50% are now possible by applying General Electric motors with Polyseal insulation systems in many outdoor, high moisture, dust and other severe atmospheres which formerly required additional enclosure protection.

POLYSEAL INSULATED COILS are vulcanized and cured—to bond and seal the supported silicone rubber tapes. Every coil must pass an underwater hi-pot test to make sure it is positively sealed against moisture and other contaminants.

THIS NEW GENERAL ELECTRIC INSULATION system also provides greater thermal, voltage and environmental endurance than conventional systems. For added mechanical strength, glass fabric supporting materials are imbedded in each layer of tape. Each coil is wrapped with many layers of this tape. Coils are securely held in the motor by G.E. patented tying and bracing techniques.

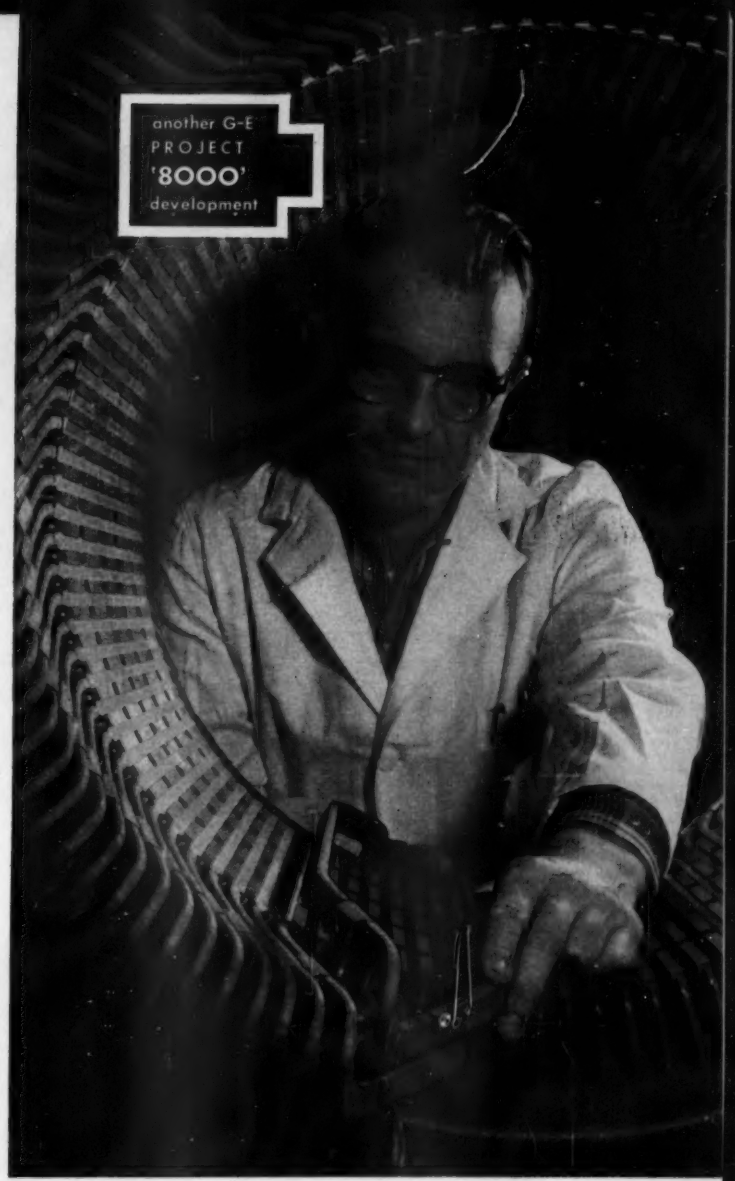
ALSO AVAILABLE IN G-E RANDOM-WOUND MOTORS, the Polyseal system is used for stator and end turns, sealing windings with a waterproof, inert covering.

FOR MORE INFORMATION on Polyseal Insulation Systems, call your nearby G-E Apparatus Sales Office, or write for bulletin GEA-6889, Section 884-4, General Electric Co., Schenectady, N. Y.

PROJECT '8000' . . . a major General Electric program of research, redesign, advanced manufacturing and improved customer service on A-c motors 150 to 6000-hp.

*Trademark of General Electric Co.

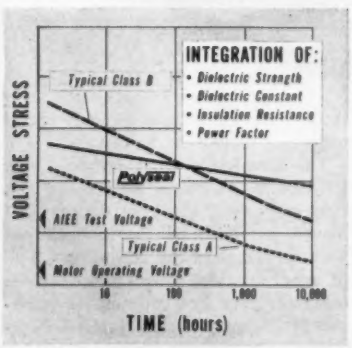
GENERAL ELECTRIC



FULLY SUPPORTED

Using specially developed G.E. supported silicone rubber tape, Polyseal is the first silicone rubber insulation system on the market that is fully supported against mechanical breakdown.

LONG LIFE



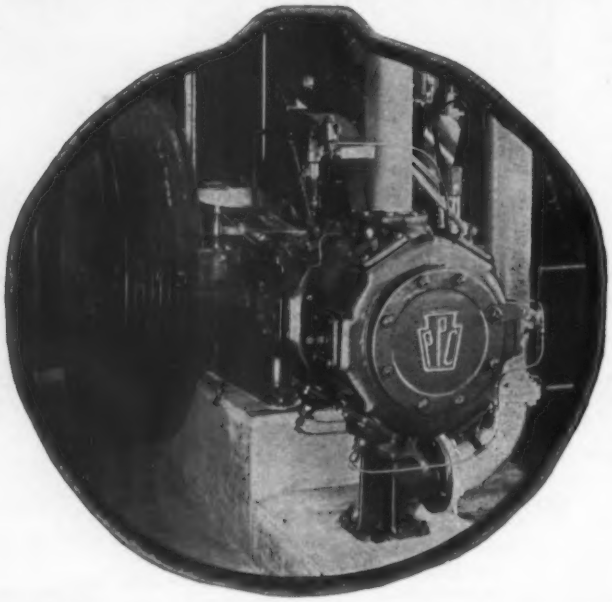
Tested over long periods of time with voltage applied, General Electric's new Polyseal silicone rubber insulation systems retain a much higher dielectric strength than other commonly-used insulations.

COMPLETELY SEALED

Positive lead seal is provided by special silicone rubber compound which vulcanizes the lead tubing to the silicone rubber wall of the coil. This effectively seals the coil against contaminants.

For more facts circle 630 on Reply Card

*with this valve
COMPRESSOR RUNS DAY AND NIGHT FOR 20 YEARS



Unusual? Yes, when you are not *getting* performance like this. No, when you have a Pennsylvania Compressor on the job. Long, long service without down-time is standard operating procedure with every Pennsylvania Compressor.

*Reason: the Pennsylvania Air Cushion Valve, constructed without nuts, bolts or screws. Stainless steel valve discs lift against a soft cushion of air; there is no flexing or bending action to weaken them. They will remain perfectly seated over long periods of service.

The compressor above delivered over 20 years of continuous performance . . . three days were lost once when it was moved, but that's all. Isn't it time you were on the receiving end of this kind of sure, sustained performance? Write today for your free copy of "Compressors for Industry" which describes Pennsylvania Compressors from 10 to 350 hp.

PENNSYLVANIA PUMP AND COMPRESSOR CO.
Easton, Pa. Earning Customer Confidence Since 1920
For more facts circle 631 on Reply Card

NEW PRODUCTS

(Begins on page 188)

is expected to find use in filter press plates, frames, filter leaves and grids, lumes and ducts, tanks.

Besides its chemical properties, Kofural Impreg is said to exhibit greater hardness, crushing strength and dimensional stability than untreated wood. Company does not recommend it for extended service exposure to wet or dry chlorine gas or related bleaching compounds, chromic or nitric acid, or hot, concentrated sulfuric acid. Wood Preserving Div., Koppers Co., Inc.

59—LONG ARMS give loaders a boarding house reach

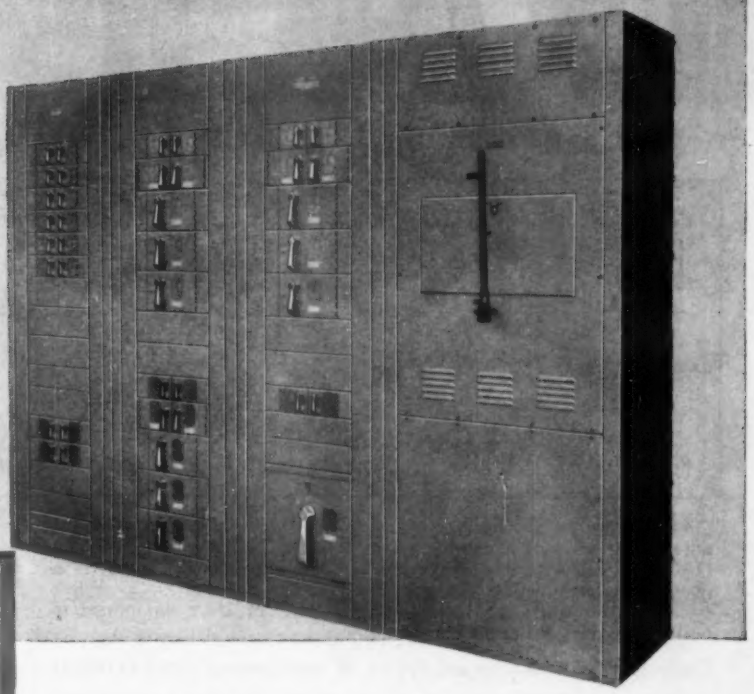
Extra-long lift arms providing greater clearance for dumping into high-sided trucks, railroad cars, tall hoppers, are available as optional equipment for this manufacturer's W-9 and W-10

Terraload'rs. The arms are 2 ft longer than standard; they give both loaders a clear dump height of 11½ ft with bucket retracted—over 10 ft with bucket fully dumped. Forward reach at 7 ft lift height is 89 in. Standard SAE rated bucket sizes for the high lift models are 1¼ cu yd for the W-9 and 1⅝ cu yd for the W-10, with 1⅝ and 2 cu yd buckets for light materials. J. I. Case Co.

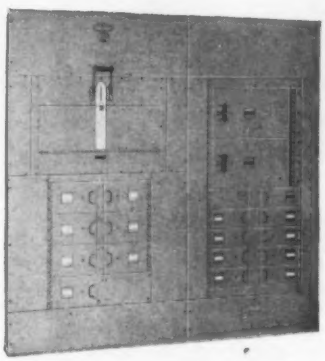
60—INTEGRATOR-COMPUTER totalizes flow

The panel-mounted C3A/1 Square Root Integrator-Computer is introduced for flow measuring systems requiring a digital readout of totalized flow. It consists of two separately housed assemblies: computer package and electro-magnetic six-digit indicator. The compact indicator is located remotely from the computer. Intended primarily for use in manufacturer's Autronic Control Systems, the C3A/1 is installed in parallel with a flow indicator, recorder and/or controller; it operates from a common 0 to 0.5 v a-c signal and has no effect on the control loop. Normal counting rate is

STANDARDIZED UNITS for "tailor-made" jobs assure quicker delivery, faster and easier installation!



S-A-W TYPE SHUTLBRAK SWITCHBOARD
Heavy duty, safety-type specially designed for the most severe use.



KLAMPSWITCHFUZ SWITCHBOARD
Features both disconnect and fuse apparatus.

CIRCUIT BREAKER SWITCHBOARD
The ultimate in automatic circuit protection.

FRANK ADAM SWITCHBOARDS

Factory-assembled standardized units—pioneered and developed by Frank Adam—permit installation of "tailor-made" switchboards in far less time for considerably less money. Interchangeable branches can be rearranged to allow for the addition of more protective units as load demands increase.

Easier to install, too! Oversize wiring gutters—accessible from front *and* back—allow fast and trouble-free installation!

Heavily electro silver-plated copper bars . . . rigid welded frames . . . quicker delivery . . . plus a dozen other outstanding features give you an impressive number of reasons for installing Frank Adam Switchboards.

See our catalog in SWEET'S

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For more facts circle 632 on Reply Card

DAY

Pneumatic Conveying & Bulk Storage News

FROM *Feathers* TO STEEL CHIPS

no job is too delicate or too tough
for DAY Air-line Conveying Systems

DAY *air-line* pneumatic conveying systems can handle hundreds of different products, efficiently and economically. That's why you find DAY equipment in a bedding plant conveying feathers . . . and in a machine shop moving steel chips. These totally different DAY air-line systems demonstrate the versatility and ability of DAY equipment to best serve your pneumatic conveying needs.

Only DAY gives you all types of equipment and services

DAY not only provides high density (so called "fluidizing") systems and low density conveying systems but also can supply all types of accessory equipment including the finest bulk storage tanks. This undivided responsibility is your guarantee of efficient, proven, dependable equipment that's right for your plant!

Vertical Bulk Storage Tanks

Horizontal Bulk Storage Tanks

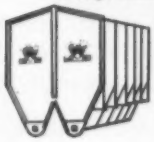


Photo (below) shows DAY air-line pneumatic system which combines product drying and cooling with conveying. This system has been in successful operation for over 6 years.

Because no one type of conveying system fits all jobs it will pay you to study DAY BULLETIN M-588. It tells how to improve plant efficiency 6 ways and make substantial savings 9 ways with modern DAY *air-line* conveying systems. Write toDAY for free copy — BULLETIN M-588.

The DAY Company

SOLD in UNITED STATES by
The DAY SALES Company
807 Third Avenue N.E.
Minneapolis 13, Minnesota

MADE and SOLD in CANADA by
The DAY Company of Canada Limited
Rexdale (Toronto), Ontario, Canada
Ft. William, Ontario, Canada

Representatives in Principal Cities

EQUIPMENT ONLY OR A COMPLETE SYSTEM

For more facts circle 633 on Reply Card

NEW PRODUCTS

(Begins on page 168)

20,000 counts per day, but it can be varied—by changing gear arrangement—to produce from 4000 to 100,000 counts per day. Digital totalization is continuous and accurate from 1 to 100 per cent of input signal, manufacturer states. Specification Sheet A-807 gives detailed information. Swartwout Co.

61—DE-SOLDER DEVICE for printed wiring assemblies

Tests conducted in actual manufacturing operation are reported to show that this induction de-solder and solder device results in man-hour savings up to 20 per cent over conventional methods in repair and salvage of printed wiring assemblies. Components can be salvaged, defective ones removed and solder joints repaired

with this induction heat device, it is announced; also entire units on large multi-terminal assemblies can be removed without damage to board or other components. This device is claimed effective for repairing: single-sided PWA's without metal (plating or eyelet) in the holes; single- or double-sided PWA's of either plated-through or eyelet types, in 1/16 to 1/8 in. minimum range of board thicknesses. Operated manually or automatically, the semi-portable device has a heat-extract sequence for de-soldering operation, and a heat cycle for soldering.

Major components are an induction heater; vacuum system for removing old solder; controls for manual or automatic operation and power level adjustment. It requires a power input of 110 v, 60 cycles, single-phase, 2 kva. It is 30 in. wide, 22 in. deep, and 21 in. high, and weighs 250 lb. General Electric Co.

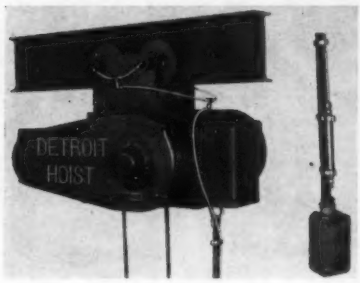
62—ROOFING COMPOUND weatherproofs, insulates

Tropical Roof Coolerant Fibrated is claimed to weatherproof and insulate old roofs in one simple operation.

Company says tests have indicated as much as 25 per cent reduction in under roof temperatures. Apply as it comes from the container with a roof brush. It seals cracks and holes, and as it dries, reflective aluminum particles rise to the top "bouncing" heat away with reflective insulation. Tropical Paint Co.

63—LUBE SYSTEM services overhead hoists from floor

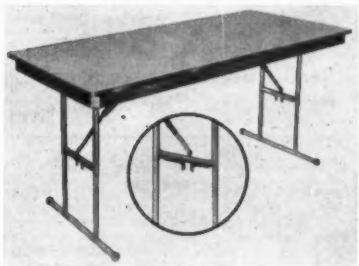
Safe-Lub, for lubricating overhead hoists from the floor, consists of tough, flexible nylon tubing. It carries lubri-



cant from a fitting mounted on the pendent control directly to the trolley wheel bearings on the hoist. It is reported to permit easy lubrication of all hoists by one man, within minutes —even while hoists are in operation. Bulletin 863 gives details. Detroit Hoist and Machine Co.

64—FOLDING TABLE adjusts to the stand-up jobs

This adjustable height folding table goes beyond normal height limitations of 30 in. It may be adjusted from 30 to 40 in. in height at 1-in. intervals and is suited for use in assembly

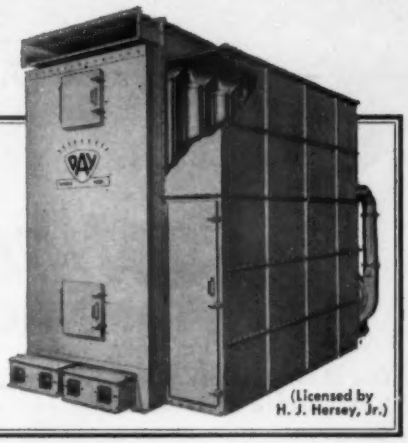


rooms, drafting rooms, mailing rooms, laboratories, other places where people must stand while they work. Of 18-gage tubular steel, welded and riveted at stress points, this table has a spring-operated finger-tip control for raising and lowering, and locking toggles on the folding leg mechanisms. There's a choice of three tops: sandel, unfinished ¾-in. fir plywood; Weytex hardboard with honeycomb core;

DAY
DUST CONTROL NEWS

Largest selling filter of its type in the world!

DAY "AC" Reverse Jet Dust Filter



Cutaway view of DAY "AC"—available housed or unhoused—for pressure or suction.

(Licensed by H. J. Hersey, Jr.)

Better Dust Control Systems Cost Less When They Include a DAY "AC" Reverse Jet Filter!

Less equipment needed

Filtering rates for a DAY "AC" are 10 to 20 cubic feet of air per square foot of filter media. These are about five times greater than old style filters. This means you get maximum filtration from a minimum filter investment. Because virtually 100% of the DAY "AC" is operating at all times, no money is wasted on intermittent or standby units. One DAY "AC" will filter and keep separated, dusts from up to 10 different sources!

Less maintenance

You know all equipment requires *normal* inspection and care. But you'll find many DAY filters have been on the job for 5, 6, 7 or even 8 years that have had no repairs whatsoever. In short, *the Day "AC" is built* to last! They have an "appetite" for work and a reputation for dependability and long life.

Less space needed

Because of smaller diameter felt filter tubes the DAY "AC" gives you a greater air handling capacity in less space. DAY "AC" filters occupy up to 50% less space — an important consideration for plants of any size!

99.99+% filtering efficiency

The real "pay off" on DAY "AC" filters is their ability to clean dust laden air with near perfect efficiency! Even "tough" materials such as carbon black or atomic energy materials are filtered with optimum effectiveness.

For additional information about the DAY "AC" reverse jet dust filter write toDAY for Bulletin F-75. It also contains pages of useful air engineering data.

The DAY Company

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rapid, natural water circulation

2-PASS DESIGN...

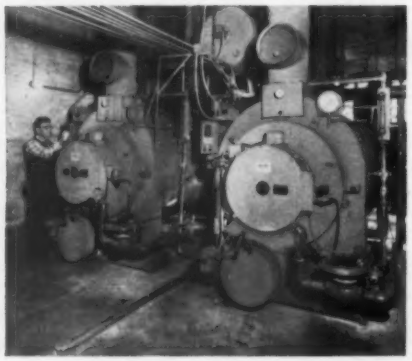
Continental AUTOMATIC BOILERS

One of the important advantages of the *Continental* 2-Pass design is the large diameter combustion tube providing maximum heat release volume, surrounded by concentric location of tubes in the water circulation path to eliminate accumulation of any insulating gas pockets. Large clearances are provided between tubes and combustion chambers as well as between tubes and outer shell. This assures unimpeded rapid water circulation down around the shell and up around the furnace.

Other *Continental* features make this 2-Pass Automatic Boiler the one boiler with the most practical and economical approach to heat transfer of all packaged boilers today... Write today on your company letterhead for latest data designed to show how you can save with a *Continental*.

NEW CONTINENTALS– NEW SAVINGS

Two new 90 hp. *Continental* 2-Pass Automatic Boilers installed in industrial plant for economy in heating, reduced maintenance costs.



CONTINENTAL BOILER Division
BOILER ENGINEERING & SUPPLY CO., Inc.
Phoenixville, Pennsylvania

For more facts circle 635 on Reply Card

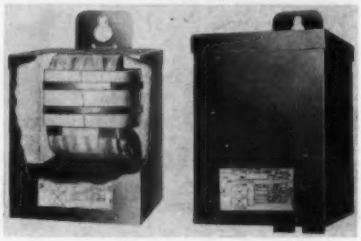
NEW PRODUCTS

(Begins on page 188)

and Marlite, a tempered hardboard of the same construction as the Weytex top with a durable plastic surface in woodgrain pattern. Foldcraft Co.

65—TRANSFORMERS are dry type, small size units

Quiet operation and small size are announced features of these epoxy compound filled dry-type distribution transformers. They are built in single-phase ratings 1 through 10 kva, 600 v and below. The sound-core Form W

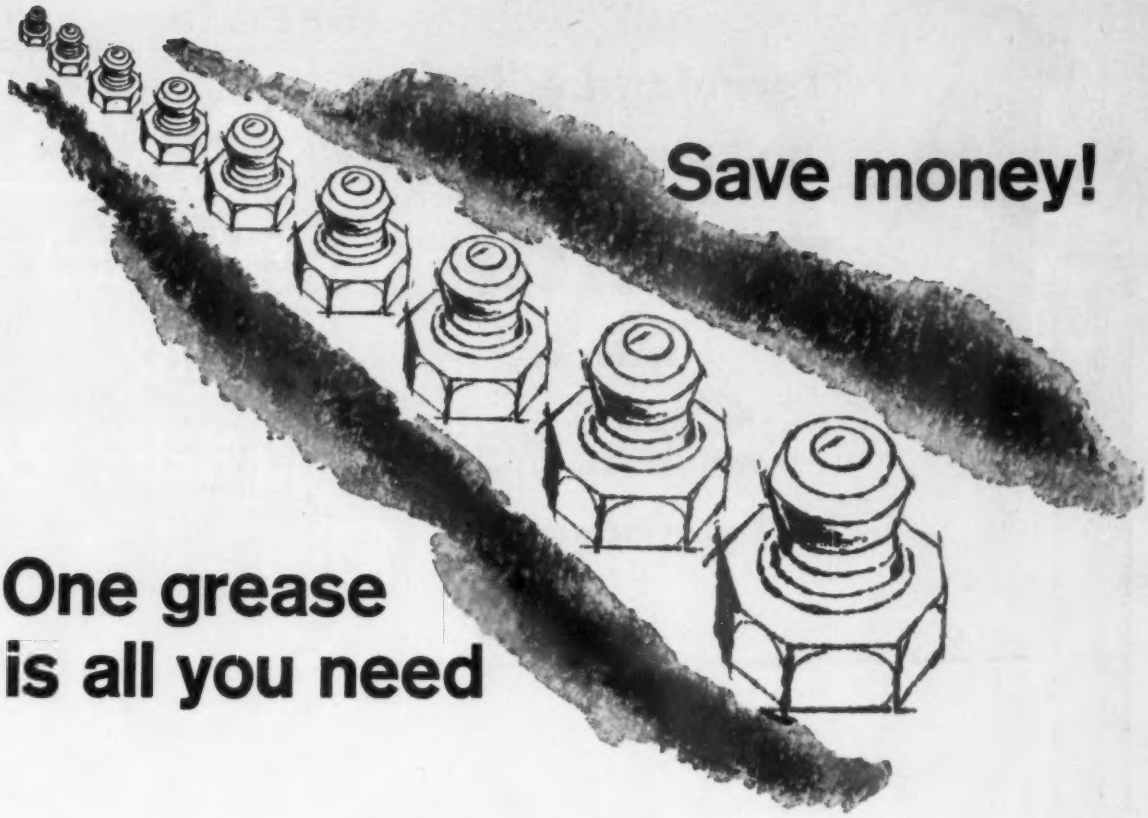


element is placed in its steel enclosure and covered with liquid epoxy resin to which filler and catalyst have been added. As the resin cures, it hardens into a block of insulating material, encasing the core and coil assembly and protecting it against dust, moisture, corrosive fumes. Use of the sound-deadening insulation eliminates need for metal framework and subassemblies. Light in weight, these transformers require no fireproof vaults, it is noted; they can be mounted in any position, on wall, floor or ceiling. Wagner Electric Corp.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

66—FLOOR FINISH seals and polishes at one time

Poli-Seal, a combination sealer and polish, is said to work well on light terrazzo, white cement, magnesite, white marble, cork, wood, ceramic tile, quarry tile and slate floors. It may also be used on most vinyls and linoleums. It provides a water-white finish that will not darken light floors, manufacturer states, and is also water-resistant and deters efflorescence of hard floors. Poli-Seal may be buffed to create a hard surface which is slip resistant, it is stated; this finish is dur-



Save money!

One grease is all you need

If you use several greases to lubricate your plant equipment—stop! You'll save money with Sinclair Litholine® Industrial Grease because this one grease simplifies inventory, saves time. Recommended for all types of bearings. It has also earned an enviable reputation for high temperature bearing performance and mechanical stability. When management asks how you've cut costs, tell them you've switched to Sinclair Litholine and show them the results.

Find out how Litholine can help you. Call your nearest Sinclair Representative, or write for free literature—Sinclair Refining Company, Technical Service Division, 600 Fifth Avenue, New York 20, N. Y. There's no obligation.

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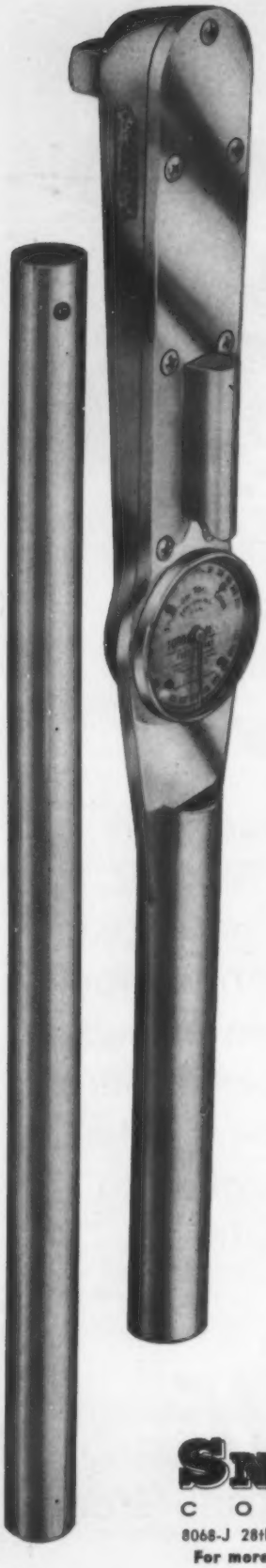


torquing by "feel" can ruin equipment

BE RIGHT

with a

Snap-on

torqometer®

With a SNAP-ON TORQOMETER, you can take the gamble out of diesel repair and every job where bolt tensions are specified. Any maintenance man can hit specifications every time — help eliminate faulty operations and undue wear of moving parts caused by mechanical distortion. With the dial of the TORQOMETER adjusted to the required torque, tighten the bolt, nut or stud until the pointer reaches zero—or, on light-indicating models, until the light flashes.

All TORQOMETERS are balanced for easy use in any position. Readings are consistent and accurate no matter where wrench is held or how much leverage is applied.

SNAP-ON builds TORQOMETER models from 0-3 in-lb to 0-4000 ft-lb. Their slim design lets you use them in tight places. Ratchet adaptors are available to do jobs where handle movement is limited.

A SNAP-ON Sales Engineer can give you more facts on the value of TORQOMETERS in your production or maintenance operations. A SNAP-ON Branch Office is located in every major U. S. industrial center.

Write, wire or phone for catalog listing the complete series plus full range of wrenches and hand tools.

SNAP-ON TOOLS
CORPORATION
8068-J 28th Avenue • Kenosha, Wisconsin

For more facts circle 637 on Reply Card

NEW PRODUCTS

(Begins on page 188)

able and worn traffic lanes can be easily patched with it. Huntington Laboratories, Inc.

67—CHARGE CONTROL prolongs battery working life

MP-3 Exide Charge Control is an automatic unit designed to help prolong the high-capacity working life of electric truck batteries. Besides assuring a fully charged battery for peak truck performance on every shift, the unit also eliminates risk of overcharging the battery, manufacturer states. It

automatically controls charging equipment as it brings the battery to a full state of charge, then automatically terminates the charge. Designed to control both regular daily charges and weekly equalizing charges, the MP-3 is said to require no attendance or setting, regardless of length of normal charging time.

Interconnected with the charging equipment this control initiates the charging process when the control indicator of the electric timing switch is dialed. You can pre-set the unit for a normal 3- or 4-hr daily finishing charge or to 6- or 8-hr weekly equalizing charge positions. Vital to the control function is a temperature-compensated voltage relay, mounted inside the case. When a battery on charge reaches 2.37 v per cell at 77 F, the relay operates to reduce charging rate and/or start the timer. The unit can be mounted on the charger or on the wall. Models are available for charging specific-sized batteries from six to 60 cells. Exide Industrial Div., The Electric Storage Battery Co.

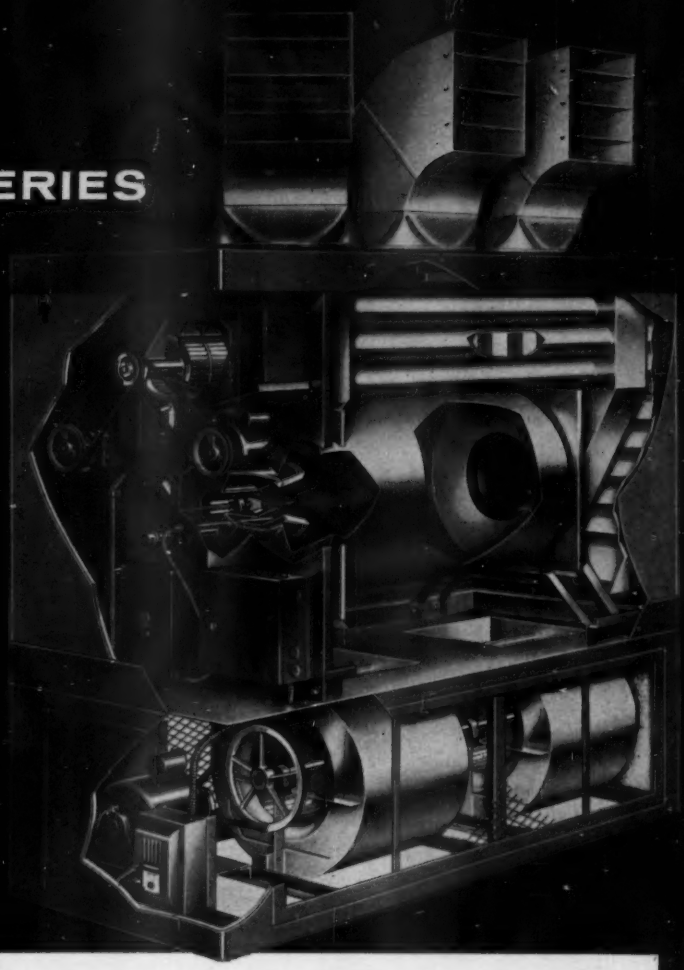
68—WATER SOLUBLE COMPOUND for spotting dies

Kemifilm 27, for spotting dies, punches, round and flat bearing surfaces, is described as a blue, non-drying, steel-marking coating which will remain

LENNOX "OG" SERIES

COMBINATION BURNER HAS "PUSH BUTTON" CHANGEOVER

Operates equally well with either gas or oil



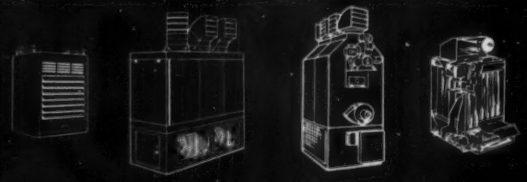
Here is a completely new type of power burner obtainable as a straight gas burner, a straight oil burner, or a combination burner for either gas or oil. For the combination burner, gas and oil are introduced at two separate points in the same firing assembly. To change from one fuel to the other, you simply throw a switch and it is unnecessary to make any further adjustments.

The outstanding performance and common sense construction of these burners is typical of the "OG" Series heater. For the complete story clip and mail the attached coupon today.

• Typical Sequence of Combination Burner Operation

1. Thermostat calls for heat.
2. Combustion air and induced draft blower starts and runs for 25 seconds providing a pre-purge period.
3. Pilot is spark ignited and must be proven within five seconds by lead sulfide scanner.
4. When pilot is proven, the main gas or oil valve opens.
5. There is now a 10-second trial for ignition period which is also monitored by the scanner. Pilot flame is then extinguished.
6. If ignition fails, main burner shuts down immediately.
7. Main flame is continuously monitored.
8. When the thermostat is satisfied, main valve shuts off. Combustion and induced draft blower continues to run for 30 seconds providing a post-purge period.

LENNOX "Task-Matched" Equipment to condition and control air for industry



64,000 to 2,000,000 Btuh Units

LENNOX Industries Inc.

Established 1895

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Please send me—without obligation—complete specifications and engineering data on Lennox Industrial heaters.

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Address..... City.....

Title.....

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C&D AutoCal*
Unitized Power-Pack

Popular mounting arrangement shows how *AutoReg*® Silicon Charger mounts inside switchgear cubicle door with controls projecting through. No manual switching or other adjustment required. PlastiCal® batteries need watering only once a year.

New C&D *AutoCal** *unitized* Power-Pack is specially designed for dependable switchgear tripping and control

Simple *AutoReg*® voltage regulated, current limiting Silicon Charger, paired with long-life PlastiCal® battery, assures high-capacity d-c power in compact package that is virtually *maintenance-free.*

Now, utilities and industrial plants can guarantee an even greater margin of reliability and protection for switchgear and control equipment. The amazing new C&D *AutoCal unitized* Power-Pack always assures full power for tripping and control.

Here, for the first time, is a dependable, high-capacity power package *specially designed for tripping and control.* Virtually maintenance-free . . . with no manual switching or adjustment required . . . *AutoCal* provides many times the life of ordinary battery and charger combinations which may be *adapted* to this critical service.

AutoCal pairs the simple, compact *AutoReg* Silicon Charger with powerful PlastiCal lead-calcium-grid control batteries. A sudden demand for tripping power merely discharges the battery over a short period. While the breaker is tripped, PlastiCal supplies any necessary constant load current as might be required for the operation of pilot lights, holding coils, and similar requirements. Once the circuit is reclosed, *AutoReg* puts energy back into the battery at a high rate until it levels off at full charge.

Here's self-protected charging . . . no charger adjustment or maintenance . . . and 25-year-life PlastiCals only require watering once a year!

For full details—write for Bulletin AR-102 today!

C&D

Since 1906

C & D BATTERIES, INC.
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Manufacturers of *Xtra-Life*® Industrial Batteries • PLASTICELL® * and PLASTICAL® Batteries for Communications, Control and Auxiliary Power • Producers of *Autoreg*® Silicon Chargers

*Trademark: *AutoReg*® *Silicon Charger and PlastiCal*® *Battery.*

For more facts circle 639 on Reply Card

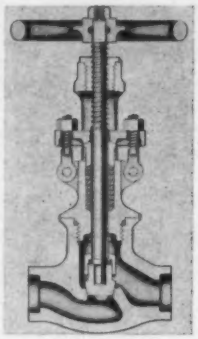
NEW PRODUCTS

(Begins on page 188)

moist on metal indefinitely. Because it is water soluble, it can be removed from clothing, skin, metal and tools, with water. And because of its non-drying properties, one application of Kemifilm 27 is usually sufficient, although the coating can be re-applied after each spot. It comes ready for use, requires no mixing, is claimed non-flammable and non-toxic. Wayne Chemical Products Co.

69—BONNET VALVES come in three classifications

This revised and expanded line of lip-seal bonnet valves covers three distinct pressure-temperature classifications rather than the two previously produced. The 3800 series of 1500-lb

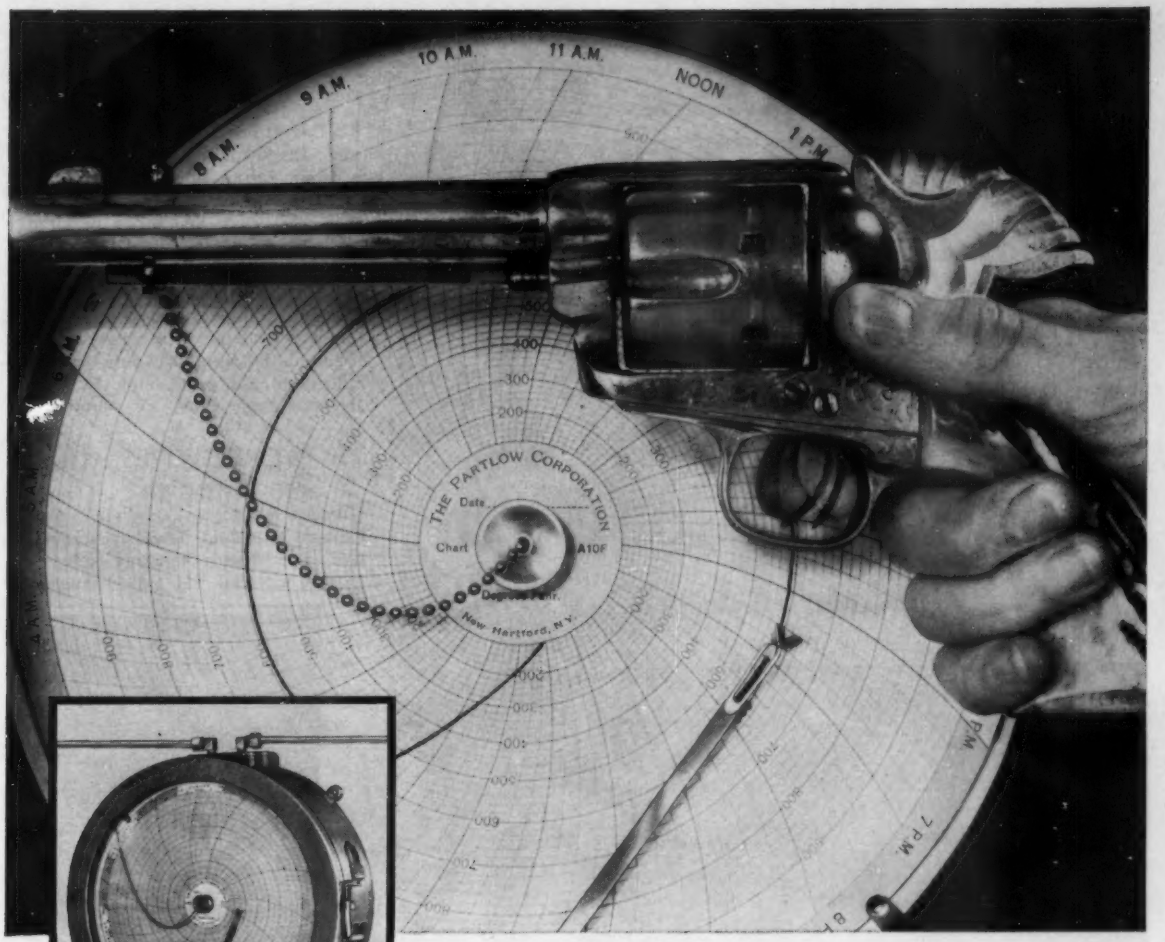


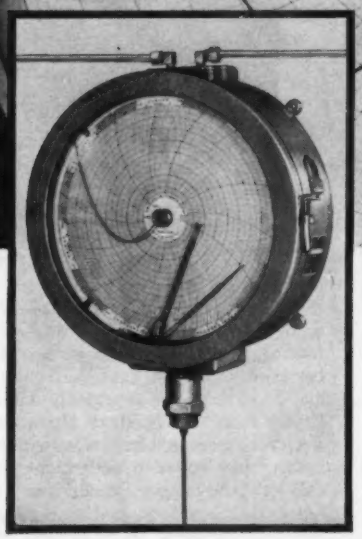
valves at 850 F comes in cast carbon steel in globe, angle and lift-check types. The 3900 series of 1570-lb valves at 1050 F is made in a cast chrome moly steel in globe, angle and lift-check types. The 4000 series of 2520-lb valves is produced in the same cast chrome moly steel, in globe and angle models. The valves, in sizes from ½ through 2 in., have been redesigned to provide a centering shoulder to avoid possibility of stem binding. Crane Co.

70—DIFFUSING GRILLE is continuous line type

Model STWA, a continuous line diffusing grille, has been added to this company's Uni-Flo series. Styled to maintain functional straight-line beauty of modern architecture, Model STWA is reported particularly effective when installed in continuous runs adjacent to large exterior glass surfaces; it can be mounted in ceiling, floor, sill or side wall. When installed in continuous runs, individual sections butt neatly together without noticeable breaks.

This grille, featuring an aluminum,





The Control Geared for

HAIR TRIGGER RESPONSE

even to Fractional Changes in Temperature!

NEW *Recording Pneumatic Temperature Control, Model RVA, available in any of 10 ranges from -30° to 1100° F.*

Extreme sensitivity—reflected in lightning-fast reaction to temperature changes—is a characteristic of *all* Partlow controls. Partlow Recording controls, however, *prove it in writing* . . . You can see for yourself how exceptional bulb sensitivity, teamed with advanced mechanical design, provide a minimum of "saw-toothing" on start-up, and maintain a rigid line of control when temperature reaches a predetermined set point.

Instant response, of course, is just one of Partlow's many built-in advantages. Another is rugged *design simplicity* that does away with hair springs and delicate electronic gadgets . . . that requires no electronic amplification . . . that permits fast, "screwdriver" replacement of the thermal element *right out in the field.*

If you use or manufacture process equipment within the -30° to 1100° F. range, there's a Partlow Pneumatic, electric or self contained gas control to fit your application *precisely*. Recording, indicating and non-indicating models available. For full details write The Partlow Corp., New Hartford, New York, Dept. PE-109.

Export: Ad. Auriema, Inc., 85 Broad St., New York 4, N. Y.

You can pay more but you can't buy better than

PARTLOW

TEMPERATURE CONTROLS

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EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER DENVER

For continuous compressed air power, install the Gardner-Denver RX compressor. It assures years of reliable service . . . requires only routine attention. The sturdily engineered, dirt-free power end—that's one reason. And behind the scenes at Gardner-Denver, cleanliness in every step of assembly is another key to endurance. Rigorous testing assures years of efficient, trouble-free performance. Get the full story on RX superiority for 'round-the-clock service. Write for Bulletin HAC-40. Gardner-Denver Company, Quincy, Illinois.

Built for the long run

Gardner-Denver RX

For more facts circle 641 on Reply Card

NEW PRODUCTS

(Begins on page 168)

flat flange, has a core designed to permit adjustment of air pattern through a simple setting of the fins. Normally furnished with a 5-deg deflected vertical air pattern which can be altered up or down by inverting the grille, it can also be supplied with a 15-deg vertical deflection. A spring clip fastening method facilitates installation, but it is available with screw holes if required. Performance data and specifications are in Catalog F 7757-1 Barber-Colman Co.

71—WORK GLOVES, oil resistant, terry cloth

Oilmacs are terry cloth work gloves claimed to retain dexterity and positive grip when handling oiled or greased material. The gloves have been

treated with an oil-repelling chemical to keep the thick, loop pile fabric from absorbing oil, so that they won't become slippery, or heavy and cumbersome. Company says that Oilmacs can be dry cleaned repeatedly without losing their oil-repellent characteristics, White reversible gloves, with red wrists, they come in both heavy-duty and light-duty types. Jomac Inc.

72—MAGNET CONTROL increases conveyor uses

Maitrol, a magnetic control system, is designed to provide selective dispatching to as many as 64 different receiving stations. At the dispatch station, a pushbutton is provided for each destination on the conveying equipment. A magnetic address, corresponding to the pushbutton pressed by the operator, is impressed on a series of magnetic address tabs—just as a piece of iron is magnetized. The unit is then dispatched. Each receiving station contains address read heads, similar to the set of address labels. The unit passes up all receiving stations until it reaches the one which responds to its coded address. At the

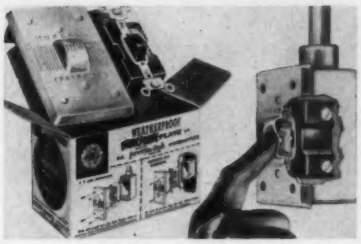
one correct station, arrival of the package sets up necessary switching action to remove it from the conveyor.

The magnetic address can be impressed on the product, the package or part itself, on cans in the carton, the banding strip, staples, tote box or conveyor belt itself. It is adaptable to single-floor or multi-floor installations or to combinations of both horizontal and vertical materials handling. Maico Electronics Inc.

It's easy to obtain product data with the postage-free Reader Service Card provided on pages 287-288. Use them for information on advertising products, too. Just circle the key number appearing at bottom of the ad.

73—WEATHERPROOF PLATE protects outdoor switches

Molded of Insulprene, a tough Neoprene-based compound, over a steel reinforced plate, this weatherproof plate is designed to protect manufacturer's Presswitch A-C Switches



against moisture, dust, dirt and other adverse conditions when used outdoors. Although sealed in, the Presswitch can be operated simply by pressing the raised surface of the plate where indicated. Another press turns it off. Plate and switch will be sold as a unit, available in 15- or 20-amp, 120-277 v ratings in a single-pole, double pole, three- and four-way units. The flush-type plate fits both FS and standard boxes. Harvey Hubbell, Inc.

74—PORTABLE SPACE HEATER burns liquid petroleum

Model LPG200 is intended for providing temporary comfort heating in maintenance shops, warehouses, dock areas and other locations not having central heating, as well as for thawing out frozen equipment and materials. The heater is radiant and recirculating, engineered for quiet sootless production of high volume heat— up to

Speedy air tools
tighten down on production costs

Cutting assembly-line time and costs, this Gardner-Denver air-powered screw driver quickly and efficiently spins screws tight in the manufacture of car radios. Note another production-booster here, too: a Gardner-Denver tool balancer—keeps tool within easy reach, reduces fatigue. These are typical examples of how Gardner-Denver hand-held air tools keep pace with fast-moving assembly work—cutting costs day in and day out. Write today for air tool bulletins.

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario
For more facts circle 642 on Reply Card

when the going gets rough-

give 'em "L"

When the load is on the crane, you'll be glad you rigged with *Leschen*—the wire rope that's the same top quality in every foot of every reel. At Leschen there are new machines with exclusive new continuous-flow technique. Try Leschen Red-Strand Wire Rope. Its uniform quality makes your operation safer, your replacement time farther in the future.

Leschen Wire Rope Division,
H. K. Porter Company, Inc.,
St. Louis 12, Missouri.

LESCHEN WIRE PORTER ROPE DIVISION

H.K. PORTER COMPANY, INC.

PORTER SERVES INDUSTRY: with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION; Specialty Alloys—RIVERSIDE-ALLOY METAL DIVISION; Refractories—REFRACTORIES DIVISION; Electric Furnace Steel—CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION, H. K. PORTER COMPANY de MEXICO, S. A.; and in Canada, Refractories, "Disston" Tools, "Federal" Wires and Cables, "Nepcoduct" Systems—H. K. PORTER COMPANY (CANADA) LTD.

For more facts circle 643 on Reply Card

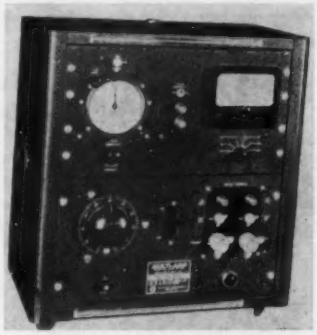
NEW PRODUCTS

(Begins on page 188)

200,000 Btu. A ⅛-hp motor drives a fan that circulates warm air at a rate of 2000 cfm. The standard model includes a burner control designed to turn off fuel should the power fail or flow of gas be interrupted. The heater weighs only 45 lb, is readily connected to a gas bottle and a 110-v a-c outlet. Stow Mfg. Co.

75—HIGH CURRENT TESTER for circuit breakers

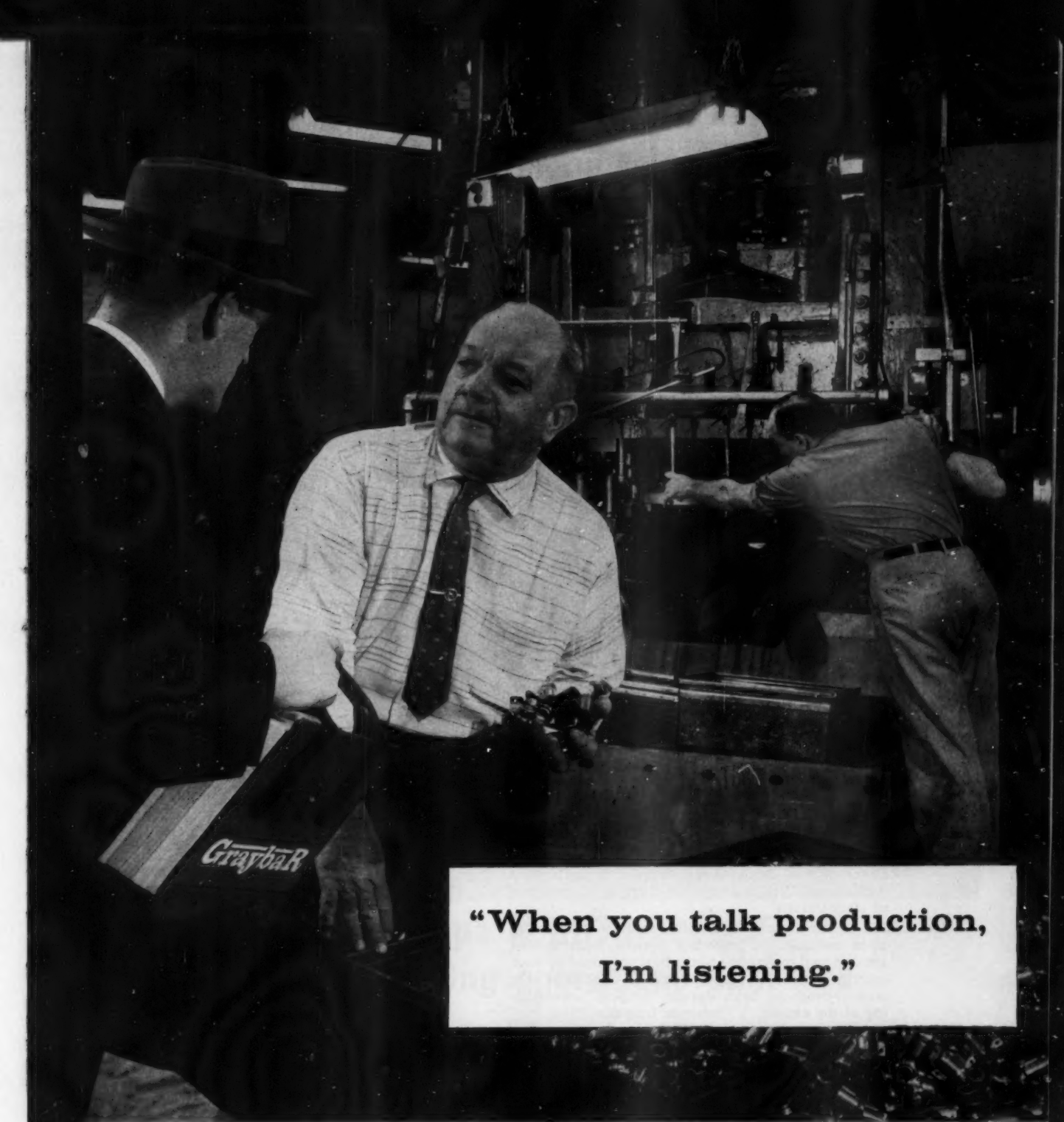
These high-current testers with built-in instrumentation for servicing current-actuated protective devices are designed primarily for testing air circuit breakers and oil circuit breakers as well as CSP transformer breakers,



motor overload relays, and current transformers. The equipment has circuitry providing a continuously adjustable voltage or high-current source for safe and accurate testing and calibration, manufacturer states. Circuit breakers are incorporated to protect test instrument and input power circuit. Instrumentation includes a timer to indicate current flow regardless of output terminal used. This timer measures elapsed time of test from 0.01 sec or 0.25 cycles, totalizing to 60 sec, also measures in minutes and totalizes to 60 min. Ratings range from 1 kva througs 30 kva, continuous duty. High-current output is obtainable at voltages down to 2.5 v. Overloads up to 500 per cent of tester rating may be had for short periods to supply current up to 15 times breaker rating. Multi-Amp Div., Multi-Amp Electronic Corp.

76—ROOF VENTILATOR exhausts more air

Available in capacities from 8000 to 80,000 cfm, the Structa-Lung is claimed to exhaust 50 to 100 per cent more air per horsepower than conventional units. This enables ventilat-



"When you talk production, I'm listening."

First things first . . . production's the subject when the Graybar man sees the production supervisor. This is why electrical equipment the Graybar man recommends, . . . and the know-how he gives, help keep production rolling.

Graybar is *the* leading independent electrical distributor. Next time . . . call Graybar. We'll work with you or your electrical contractor. 95

GraybaR

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Everything Electrical GraybaR ELECTRIC COMPANY

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HEINEMANN HAS A CURE
FOR THE NUISANCE TRIPPING AILMENT

THE SYMPTOMS of panelboard sickness are easily recognizable. Breakers trip mysteriously. Service is interrupted without apparent reason. Yet there is no evidence of circuit faults.

THE CAUSE of the malady is, usually, ambient heat acting upon thermal-type protectice devices. Such devices are designed to respond to the heat produced by load current. Trouble is, ambient heat gets added in with current-produced heat. Result: "artificial" overloading of the circuit . . . nuisance tripping.

THE CURE is obvious. Change over to circuit protectors that are not heat sensitive. Heinemann circuit breakers, for example. Heinemann breakers are magnetically actuated, have hydraulic time delay to allow for starting inrush or harmless transient overloads. They operate directly on load current, not the heat generated by that current. So: there's no heat effect on current-carrying capacity. No nuisance tripping. Just safe continuity of service . . . always.

FOR MORE INFORMATION, SEND FOR BULLETIN 3103

HEINEMANN
ELECTRIC COMPANY
128 Plum Street, Trenton 2, New Jersey

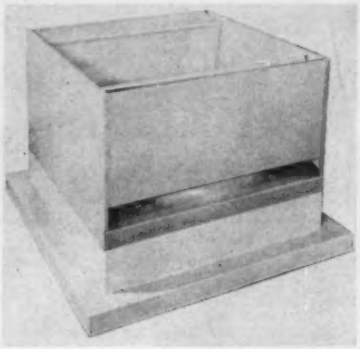
For more facts circle 645 on Reply Card

S.A. 1060

NEW PRODUCTS

(Begins on page 188)

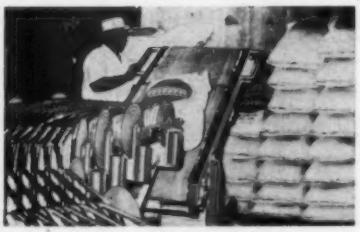
ing a building with fewer units than otherwise required, it is pointed out, and reduced noise. In operation, this ventilator's powerful suction sweeps



up heat, moisture, dust and fumes, to exhaust them in a jet that shoots upward 20 to 30 ft above the roof, manufacturer states, and the only maintenance normally required is annual removal of accumulated dirt with a long handled wire brush. Of welded steel construction, the Structa-Lung includes a fresh air breather duct to protect and ventilate the fan motor. When the fan is turned on, automatic dampers in the top of the ventilator open to provide an unobstructed exit; when the fan is off, the dampers close. Bulletin 159 gives details. Structa-Lung Co.

77—LOADING CONVEYORS with increased belt life

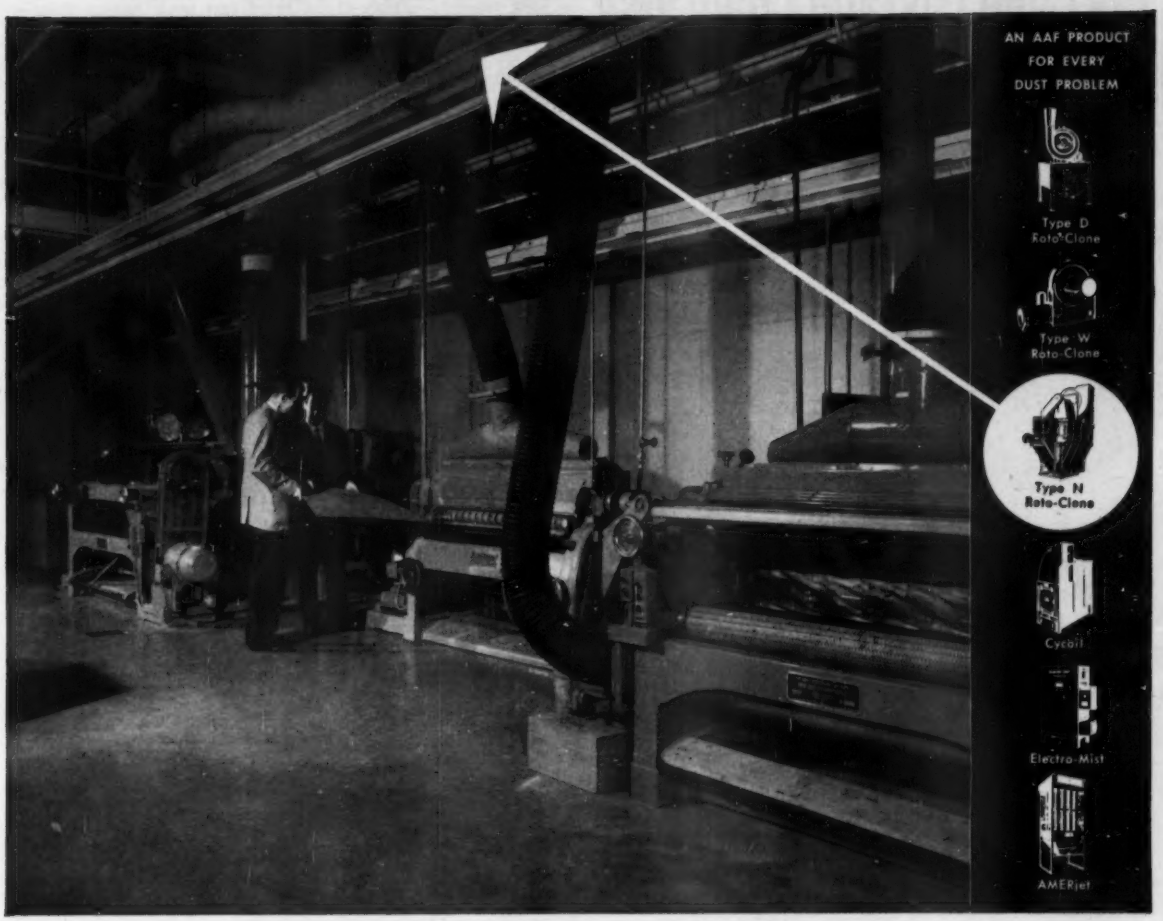
Three times the service life of previous materials is announced for the conveying surface utilized on this company's 1960 model car loaders and bag conveyors. They use spring



steel belts to permit a continuous bag conveying surface which can be swung to right or left for high speed loading of box cars and trucks and other bag conveying service. Other improvements announced for the new car loader include greater strength and simplicity, greater resistance to abuse. The Power-Curve Conveyor Co.

(Continued on page 246)

POLISHING



AAF Type N ROTO-CLONES keep polishing operations dust-free

● This sparkling clean polishing area proves that flat-stock polishing need not necessarily be a dirty business. With AAF's wet-collecting Type N ROTO-CLONES continually snuffing out the dust threat, maintenance costs go down, employee morale and productivity go up.

AAF's complete line of dust control equipment was application-developed, now challenges *any* metalworking dust problem, regardless of the metal. Where are troublesome dust, fumes or mists causing you trouble – grinding, buffing, polishing, plating, dry machining, wet machining, heat treating, abrasive cleaning? All can be effectively and economically controlled by AAF.

For the answer to your polishing dust problem, call your local American Air Filter representative, or write direct for Type N ROTO-CLONE Bulletin 277. Address Mr. Robert Moore, American Air Filter Company, Inc., 228 Central Avenue, Louisville, Kentucky.

AAF **American Air Filter**

BETTER AIR IS OUR BUSINESS

For more facts circle 646 on Reply Card

no more knuckle-busting...

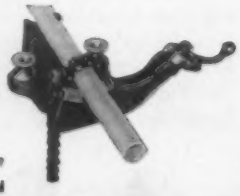
New RIDGID 450 Portable Tristand Chain Vise

has Large, Easy-to-Operate Top Screw Handle right up on top!

Here's a real time saver. Not only do you get a complete workbench that's truly portable, but now you get a chain vise that's extra easy and fast to operate. Handle is right up on top where it's always handy. Handle and tightening nut are anchored to vise base . . . can't pull out.

Vise base, that overhangs front legs for clear tool swing, has hanger slots for tools, 3-size pipe bender, rear pipe rest and adjustable ceiling brace screw. Folding legs and integral tray set up easily and lock in position for rigid work base. Snap chain holds folded legs closed for easy carrying . . . no loose parts. Rubber grommets in tristand feet prevent creeping. See and try this more-for-your-money RIDGID Top Screw Chain Vise at your Supply House!

New RIDGID Bench Chain Vises
have same Extra-Efficient Top-Screw Adjustment.



5 Sizes for ⅛" to 8" Pipe, Conduit or Rod

The Ridge Tool Company, Elyria, Ohio, U.S.A.

For more facts circle 647 on Reply Card

NEW PRODUCTS

(Begins on page 188)

78—AIR HOSE takes to weather extremes

Synflex Universal Air Hose will neither balloon in hot weather, nor stiffen in cold weather, it is announced. Its light weight—reportedly a third less than rubber hose—suggests use with portable air-operated tools. Other uses are for jigs and fixtures. A polyamide formulation, this air hose is said to possess nylon's inherent imperviousness to oils, dimensional and chemical stability and toughness. Color coded for high visibility and safety, it is designed for normal operating pressures. It comes in four sizes from 3/16 to ⅜ in. ID, in 500-ft lengths. Synflex Products Div., Samuel Moore & Co.

79—ADHESIVE bonds many surfaces

Conley Weld C1-C2 is an epoxy resin adhesive available in commercial quantities for bonding metal, wood, glass, ceramic masonry, rubber, porcelain, fiberglass and other plastics. Application requires only visual equal-portion measuring and mixing (after sanding or buffing bonding area). Manufacturer says it contains no metal, is nontoxic, non-explosive, and resistant to dilute acids and alkalis. Ed Conley Plastic Corp.

80—TANK COVERS are strong, self-supporting

Duracor Tank Covers are introduced for handling strong acid solutions at elevated temperatures in chemical, metalworking and textile industries. Designed to meet individual plant operating specifications, these covers are intended to replace metal, brick and lead fabrications at compara-

tively low cost. They require no lining or painting. The one shown (for an application involving hydrofluoric acid) is fabricated from 6400 Series Duracor for maximum fire retardance and resistance to heat distortion, and designed for operating temperatures of 280 to 300 F. It measures 25 ft in diameter, is ½ in. thick, and designed to support the weight of two 200-lb men at any point. Reinforced outer perimeter and I-beam construction make it self-supporting. Stiffeners, manholes and access openings are molded from Duracor. The Ceilcote Co.

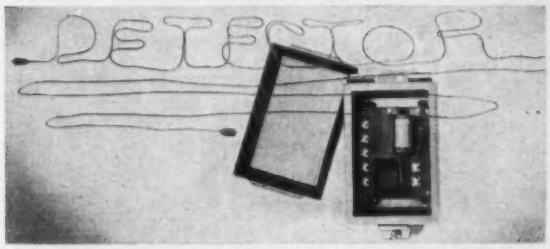
81—FIRE PROTECTION for the smaller areas

This system is designed to make CO_2 fire extinguishing techniques available economically for smaller, hard-to-reach areas with hazardous conditions, upper floors of buildings where larger, low-pressure tanks cannot be installed, limited space areas etc. It utilizes high-pressure liquid carbon dioxide in easily stored cylinders, and includes a control mechanism with continuous monitoring device. The system operates instantly, manufacturer states, actuated by signals from fire detection devices, smoke detectors, flame detectors or other sources and is available with automatic, manual-electric, manual-automatic, or straight manual methods of actuation, all having manual

pushbutton stations. It is designed to sound a pre-discharge alarm, release doors and windows, shut off fans, motors and machinery. Cardox Div., Chemetron Corp.

82—TEMP DETECTOR is multi-point monitor

Rather than being sensitive to temperatures only at several pre-determined points, the Line Detector is designed to respond to thermal conditions over its entire length. In essence, it is a multi-point monitor covering an infinite number of points. Operation is based on temperature-resistance relationship of selected eutectic salt mixtures. These salts, packed into an Inconel tube, surround a nickel



wire center conductor. When temperature reaches set point, a short circuit is caused between center conductor and outer tube which, in turn, is sensed by a control unit to actuate an alarm or other working device.

The tubing may be bent to practically any desired configuration, as shown, along with control unit. Standard elements may be connected in series to form lengths of several hundred feet, and in one system several temperatures can be detected. Eight presently available temperatures range from 255 to 1200 F. Industrial applications of the Line Detector include nuclear reactors, catalyst beds, bearing overheat, petroleum processing, grain storage and other uses where detection of random hot spots is desirable. Fenwal Inc.

83—SURFACE PROTECTION for metal removal

Protex is a surface protection compound for use with the Arcair metal removal process. Air blast from torch will not blow it away from the surface being worked, it is pointed out. Protex is applied to the surface with a paint brush and there is no waiting period for it to dry before beginning work. Though not required on most metals during Arcair operations, Protex is suggested for use on stainless steels, machined surfaces and similar applications. It can also be used advantageously for welding operations, and to prevent formation of scale during heat treat or stress relief operations. After use, it is wiped off with a dry cloth. A gallon protects up to 3000 sq ft of surface. Arcair Co.

84—RUST PREVENTIVE protects stored metals

Charcool 1720 is announced as a rust preventive and corrosion inhibitor providing up to 3-yr protection on metals stored outdoors. According to company, it deposits a hard, non-tacky film which adheres to any metal surface without checking, flaking or cracking at temperatures down to 0 F. Formulated to protect outdoor uncovered die casting and trim dies, draw dies, machine tools, jigs and fixtures, Charcool 1720 is said to retain homogeneity in solution after exposure to temperatures from —40 to 130 F, and to cause neither pitting nor etching to ferrous or non-ferrous metal. Protective film provided is flexible, brown in color. It is removable with cleaning solvent. The American Charcoal Co.

(Continued on the next page)

To save time . . .
Every Tool Box Needs
a compact, easy-to-carry

RIDGID®

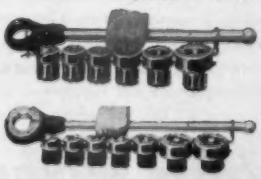
Drop Head Threader Set

Snap a die head in the ratchet ring . . . cut your thread! It's as simple as that with a RIDGID drop head threader. Heads can't fall out . . . dies reverse quickly for close-to-wall threading. Finest quality RIDGID long wearing dies. Conduit dies available.

Call Your Supply House!

Hand Carrier Free With All Sets Except No. 12-R

(Order in sets or any combination)



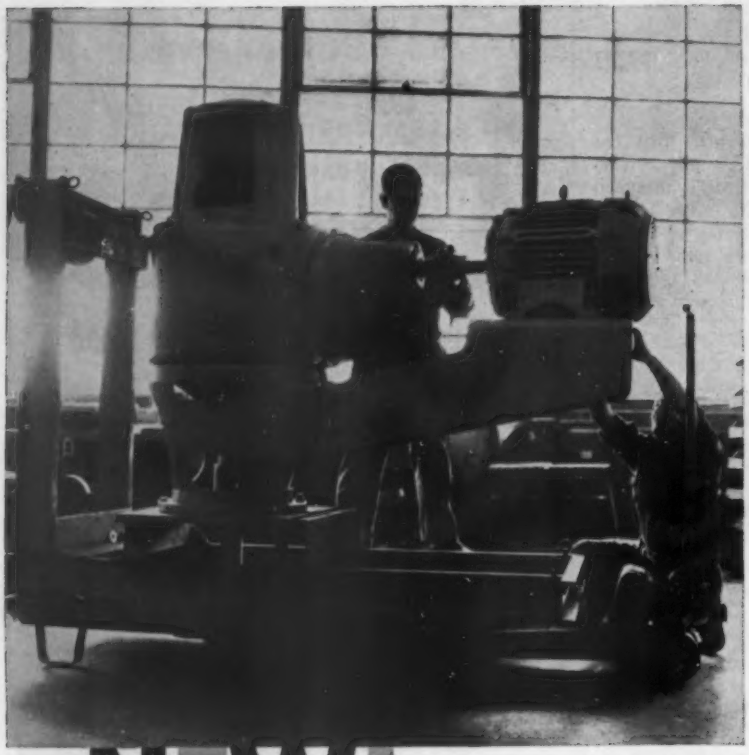
Exposed Ratchet Type
For pipe—⅛" to 1"—00-R
⅛" to 1¼"—111-R
⅛" to 2"—12-R
For bolts—¼" to 1"—00-RB

Enclosed Ratchet Type
For pipe—⅛" to 1"—0-R
⅛" to 1¼"—11-R

RIDGID

The Ridge Tool Company · Elyria, Ohio, U.S.A.

For more facts circle 648 on Reply Card



NEW!

Fast delivery on mixers this big

Why wait months when you need a turbine-type fluid mixer as hefty as this one?

You can get delivery of the new "5" Size LIGHTNIN Mixer shown here *in a few weeks.* That's because the speed reducer and other component parts are in stock at the factory, ready to assemble to your order.

Ratings range from 10 to 150 hp. And, at lower cost than ever for a mixer of this rating spread, you get these standard LIGHTNIN Mixer advantages:

1. Choice of 15 standard *interchangeable* speeds, 16.5 to 280 rpm.
2. Simple, on-the-tank conversion from double to triple reduction should process requirements change.
3. Gearing protected from shaft shock loads by unique hollow-quill construction.
4. Positive splash lubrication.
5. Complete weatherproofing protection.

For details, call your LIGHTNIN Mixer representative now. You'll find his name in Thomas' Register and under "Mixers" in the yellow pages of your telephone directory. Or write us direct.

"Lightnin® Mixers"

MIXCO fluid mixing specialists

MIXING EQUIPMENT Co., Inc., 144-k Mt. Read Blvd., Rochester 3, N.Y.

In Canada: Greey Mixing Equipment, Ltd., 100 Miranda Avenue, Toronto 19, Ont.

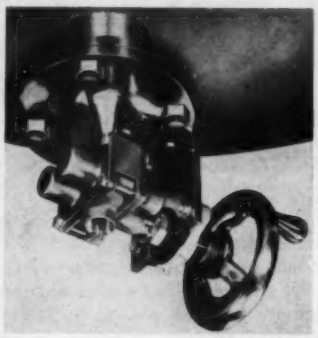
For more facts circle 649 on Reply Card

NEW PRODUCTS

(Begins on page 188)

85—VALVE energizes viscous media "too thick to flow"

The Gear-Vac Valve is designed for valving small flows of viscous media (up to 250,000 SSU). According to manufacturer it is about half the port size and half the price of a conventional plug cock, and it provides bubble-free flows which are measurable and reproducible, and no heating or pressurizing is required to induce flow



through the valve. The Gear-Vac Valve operates by producing almost absolute vacuum, it is explained, causing atmospheric pressure to collapse the viscous mass into the vacuum pocket and provide a constant supply in the gear chamber for dispensing with metering accuracy within ± 2 per cent. Instead of restricting passage of media, the valve develops reduced flows by correspondingly reducing the rpm (or distance of travel, for measured slugs) of the gear mechanism. When the mechanism stops, the flow of media is stopped.

Gear-Vac Valves are available with handwheel for manual operation, and motor-operated with pulley, sprocket wheel or flexible shaft drive for remote or process-controlled operation on constant or cyclic flows. Eco Engineering Co.

86—PLUG-IN UNIT cools off soldering gun tips

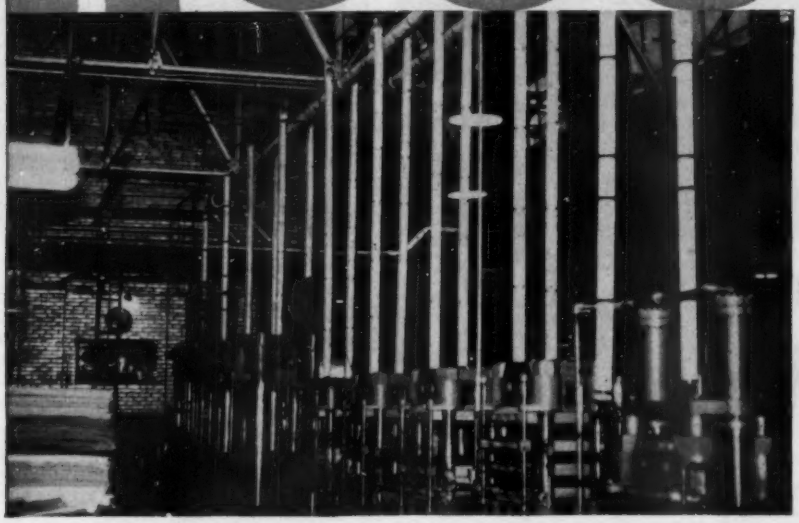
Gunchoke is designed to reduce the tip temperature of soldering guns to assure correct temperature when soldering printed circuits and laminated wiring boards. It is made in models adaptable for many soldering guns, and is small enough to fit into a tool kit. You simply plug the soldering gun into Gunchoke and Gunchoke into the outlet. Two adjustments serve to permit reducing temperature to either 500 or 600 F. Besides preventing damage to circuits and boards through use

ROSS Air Systems

Engineered Atmospheres for Better Processing

ROSS SUPERTHERM

UNIFORM LOW COST HEAT FOR PROCESSING AND SPACE



Section of the Supertherm System serving the presses.

The First Installation in the U. S. (1936) Still Proves Its Economy and Efficiency for Providing Process Heat

Synthane Corporation, of Oaks, Pa., producers and fabricators of Laminated Plastics for Industry, installed the Ross-Supertherm High Pressure Hot Water System for providing *uniform* heating . . . and *uniform* cooling . . . to its presses and treating ovens. Cooling is included because the same medium serves for both heating *and* cooling.

Uniformity of heating and cooling is the key to consistently high end-product quality. Right from the start the Supertherm System provided this better than the previous steam system. It proved its economy after the change-over, too, because this system provided 26% greater efficiency than the good steam system previously in use.

The many users of the Supertherm System in the States and Canada get not only a more uniform heat at temperatures that can go to 400°F and beyond, but also a more economical heat. The process benefits and the economies are so attractive that anyone planning a new process or to use space requiring heat should investigate the Ross-Supertherm System. Likewise those who are dissatisfied with their present heating methods.

M-R

THE MIDLAND-ROSS GROUP OF COMPLEMENTING SERVICES

J. O. Ross Engineering, New York
John Waldron Corporation, New Brunswick, N. J.
Andrews and Goodrich, Boston
Ross Engineering of Canada Limited, Montreal
Ross Midwest Funds, Dayton
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For more facts circle 650 on Reply Card

Performance was "gone with the wind"

till they installed Marley

DOUBLE-FLOW® AQUATOWERS

"These two 'little' towers give us capacity and temperature that make operation ideal," says Earl Smith, Chief Engineer of the world's largest milk processing plant. He's referring to two Marley Double-Flow Aquatowers that now occupy the same basin where a 40-foot atmospheric deck tower used to stand.

"When the Arden Farms plant in Los Angeles was built, its location was completely open," Mr. Smith adds, "but year by year, more and more industrial plants ringed us in and our water temperature rose accordingly. Under today's demanding production schedules, positive temperature of process cooling water is imperative, so the deck tower had to go."

Marley's Double-Flow Aquatower, industry's first choice for intermediate-capacity services, is only part of the complete Marley line of cooling towers that range from small packaged units for "spot" cooling to giant industrial towers. If outmoded or inadequate cooling towers are jeopardizing production in your plant—or if you are wasting water in even small quantities in some corner of your plant—call your Marley Application Engineer today. Without obligation, he'll make a professional survey of your water cooling requirements and show you, too, how to turn "hot spots" into "profit spots."

The Marley Company MARLEY

Kansas City, Missouri

For more facts circle 651 on Reply Card

NEW PRODUCTS

(Begins on page 188)

of excessive heat, this device eliminates need for a slow-heating soldering iron of unknown tip temperature in favor of a quick-heating soldering iron of known temperature. Electric Soldering Iron Co., Inc.

87—CHECK VALVES with air cushion assemblies

Air and gas valves in the Airchek line use the same air cushion valve design used in manufacturer's air and gas compressors, in which flat, annular stainless steel discs, guided at outer periphery, lift against a cushion of air or gas, as shown. Air cushion action

increases service life and eliminates "slam," company states; the valves last longer and the valve seat design fractionates the mass flow of air or gas and dampens the pulsations present in compressor discharge lines. Air hammer and tank ring claimed to be practically eliminated and piping vibration reduced. Airchek Valves can be installed in any position, can be inspected and renewal parts installed without disturbing piping. They are suitable for discharge lines ¾ to 12 in., for pressures to 600 psig. Pennsylvania Pump & Compressor Co.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 279-280.

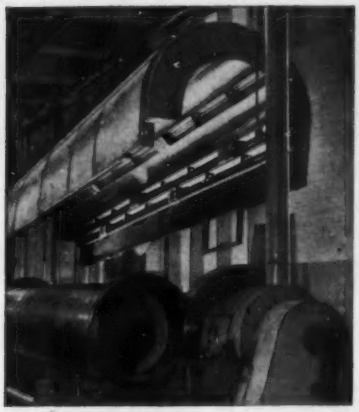
88—NON-SKID SURFACING for hazardous floors

Chemi-Top Safety Floor is described as a non-skid resurfacing compound that is chemically inert and trowels to a tough topping for areas covered with grease, acids, alkalis and other hazardous liquids. It contains a sharp aggregate that penetrates oil films and makes a firm contact with workers'

...the U.S. Navy's new Mark 32 fibre-glass torpedo launcher

From its unlikely beginning as a fibre-glass mat . . . to its successful operation in sub-freezing sea spray . . . the Mark 32 torpedo launcher testifies to the versatility and dependability of Chromalox electric heat. Designed and built by Apex Reinforced Plastics, division of White Sewing Machine Corp., this lightweight, corrosion-resistant launcher is now in service on Navy destroyer escorts.

In early production stages, a Chromalox-heated hood is used in centrifugal molding of the launcher tubes.

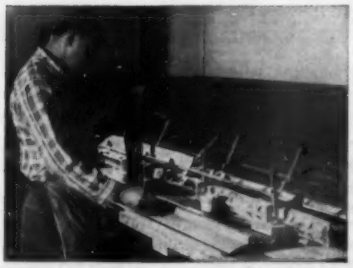


First, a rolled fibre-glass mat is placed inside the mandrel, which is then engaged in spinning motion at 800 rpm. After thermosetting resin has been sprayed into the mandrel, the hood is lowered into position for heat curing. The Chromalox type RAD Far-Infrared Heaters have a total capacity of 36,600 watts, and work reaches approximately 200°F. in about 45 minutes. The hood remains on a total of about 3½ hours, throughout the spinning operation.

Before final assembly, each tube must have steel "nut bars" and "guide bars" cemented to its interior. (Nut bars connect the three tubes into one assembly; guide bars guide torpedoes into each launcher tube.) After these parts have been cemented in place, two Chromalox Tubular Heaters wired in series are used to set the cement.

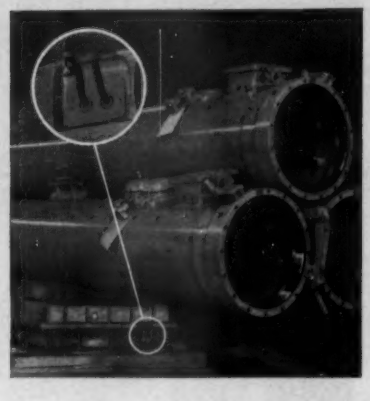
Mounted in a frame which holds them in the center of the tube for its entire length, the 240-volt, 2750-watt heaters are controlled by a Chromalox type AR Thermostat. A small fan attached to the end cap circulates heat within the tube and eliminates condensation during the drying operation.

Next, four plastic quadrants are bolted to the tube interior, forming a liner to accommodate 12¾-inch torpedoes. To each quadrant are affixed two 101-inch Chromalox Flexible Woven Heaters shown below being cemented



in place. After resin has been applied to the two channels in each quadrant, heaters are laid in place. The leads are then connected to a power outlet and the heaters set the cement which bonds them in place. In action, these heaters maintain a protective 50°F. minimum temperature for the torpedo.

The closeup below shows two leads of a circular Chromalox Tubular Heater clamped in a groove around the launcher's swivel base. To prevent formation of ice in the joint between fixed and rotating parts of the base, this heater comes on automatically when the temperature drops below 50°F.



Perhaps one of these heaters, or one of the 15,000 other types, sizes and ratings of Chromalox Heaters can answer your need for heat. For personal assistance and specific recommendations, *call your Chromalox Man for the Answers.* He's listed below.

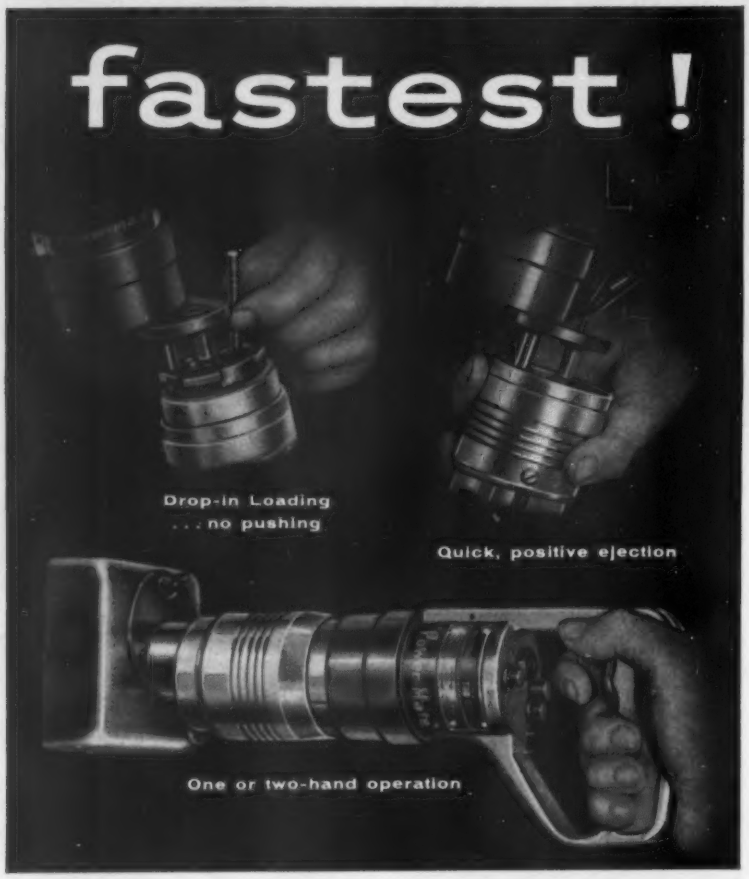
Atlanta, Ga. TRinity 5-7244
Bala-Cynwyd, Pa. MOhawk 4-6113
Baltimore, Md. HOpkins 7-3280
Binghamton, N. Y. RA 4-7703
Bloomfield, N. J. EDison 8-6900
Boston, Mass. Liberty 2-1941
Buffalo, N. Y. SUmmer 4000
Charlotte, N. C. EDison 4-4244 FRanklin 5-1044
Chattanooga, Tenn. AMherst 5-3862
Chicago, Ill. HArrison 7-5464
Cincinnati, Ohio TRinity 1-0605
Clearwater, Fla. Phone 3-7706
Cleveland, Ohio PRospect 1-7112
Dallas, Texas Riverside 1-9004
Davenport, Iowa Phone 6-5233
Denver, Colo. GLendale 5-3651 GEnesee 3-0821
Des Moines, Iowa CHerry 3-1203
Detroit, Mich. UNiversity 3-9100
Houston, Texas CApitol 5-0356
Indianapolis, Ind. MElrose 5-5313
Kansas City, Mo. Victor 2-3306
Los Angeles, Calif. Richmond 7-5191
Middletown, Conn. Diamond 6-9606
Milwaukee, Wis. BRoadway 1-3021
Minneapolis, Minn. FEderal 6-3373
Nashville, Tenn. CYpress 2-7016
New York City, N. Y. WOrth 4-2990
Omaha, Nebraska ATlantic 7600
Philadelphia, Pa. GReenwood 3-4477
Pittsburgh, Pa. EMerson 1-2900
Portland, Oregon CApitol 3-4197
Richmond, Va. ATlantic 8-8758
Rochester, N. Y. HAmilton 6-2070
St. Louis, Mo. CHestnut 1-2433
San Francisco, Calif. UNderhill 1-3527
Seattle, Wash. MAin 4-7297
Syracuse, N. Y. HOward 3-2748
Wichita, Kansas AMherst 2-5647

7789

CHROMALOX
Electric Heat
INDUSTRIAL • COMMERCIAL • RESIDENTIAL
EDWIN L. WIEGAND COMPANY
7529 THOMAS BLVD., PITTSBURGH 8, PA.

For more facts circle 652 on Reply Card

Remington Stud Driver



Loads in seconds . . . sets up to 9 studs a minute in concrete or steel

Here's the most efficient powder-actuated fastening tool ever designed. It's the new Remington Stud Driver with an *exclusive* combination of features that make it your best buy.

Built for speed, it has fast, easy drop-in loading. With Remington "Power-Guide" studs, no ramrod pushing of stud is necessary. Quick, positive ejection is another timesaver. A flip of the wrist and the fired cartridge pops out. With other tools the chamber bushing must be removed by hand, which is clumsy and slow. And only the Remington Stud Driver can be converted to one- or two-hand operation. No other tool has this feature.

Other advantages: Easy, fan-type opening and closing of tool and instantly interchangeable guards for greater versatility, efficiency.

Send coupon for special booklet that proves why the Stud Driver is the fastest powder-actuated tool—and best for you.

CHOOSE THE POWER MOST EFFICIENT FOR YOU. REMINGTON POWER TOOLS ARE AVAILABLE IN
AIR • ELECTRIC • GASOLINE AND POWDER-ACTUATED MODELS

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Please send—without obligation—catalogs on Remington Contractor & Industrial Tools checked below:
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☐ Concrete Vibrators ☐ Electric Tools ☐ Flexible Shaft Machines
*Name*_____ *Position*_____
*Company*_____
*Address*_____
*City*_____ *Zone*___ *State*_____

For more facts circle 653 on Reply Card

NEW PRODUCTS

(Begins on page 188)

shoes. It is suggested for ramps, dockboards, stair treads, catwalks. According to manufacturer, this surfacing resists corrosive effects of oils and greases almost indefinitely—doesn't peel off. The Garland Co.

89—BATTERY CHARGERS on wheels or for walls

Variable Voltage Rectifiers (VVR) are designed to charge an entire battery, any cell, or group of cells within the battery up to the charger's rated capacity. The line includes models for use on batteries with up to 32 lead-acid cells or 50 alkaline cells, available in cabinets with wheels or for

wall mounting. They are equipped with silicon rectifying diodes. To operate one of these chargers you simply connect a-c lead to proper power source; connect d-c leads, marked for proper polarity, to battery; push a-c breaker switch to "on" position; and turn the Powerstat transformer control clockwise to point where ammeter registers desired charge rate. Manufacturer points out that with no moving parts other than required relays and contractors, maintenance of these chargers is reduced to a minimum. Exide Industrial Div., The Electric Storage Battery Co.

90—SAFETY SWITCHES for heavy duty applications

Rated from 400 through 1200 amp, and having a 100,000-amp interrupting capacity when current limiting fuses are inserted, QMQB Safety Switches are announced as offering safe fuse protection at economical cost. Essentially these switches are manually operated circuit interrupters employing a circuit breaker type mechanism in conjunction with fuses. Standard quick-make, quick-break contact-operating mechanism of circuit breakers are used, omitting the

For more facts circle 654 on Reply Card ⟶

TEXACO ORGANIZED LUBRICATION CAN HELP YOU . . .

End replacement parts waste

One Northeastern manufacturer replaced parts in a major machine every two weeks—a not uncommon practice in industry today. He marked it off as a normal maintenance expense. It wasn't really—it was the result of faulty lubrication practices. A Texaco Lubrication survey spotted the trouble—solved the problem. Now the manufacturer operates with a Texaco Organized Lubrication Plan—and the trouble no longer exists.

Chances are the same thing is happening in your plant right now—It doesn't have to.

A Texaco Organized Lubrication Plan can extend parts life significantly—saving thousands of dollars in replacement parts and even more in uninterrupted production for longer periods.

Get full details on Texaco Organized Lubrication from your local Texaco Lubrication Engineer. He can supply you with a copy of "Management Practices that Control Costs via Organized Lubrication." Or write:

Texaco Inc., 135 East 42nd Street, New York 17, N. Y., Dept. E-112.

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

Only Sylvania guarantees premium performance in its standard fluorescent lamps at standard prices—*with an exclusive Light Insurance Policy!*

Sylvania Fluorescent lamps are made to *one* standard of quality only—the highest. And you get it at standard prices.

Conduct your own light meter test. Take for instance, Sylvania's 40-watt Cool White Rapid Start Lamps and any similar competitive lamp claiming extra lumens. Operate them for a few weeks. Keep a record of their performance.

You'll prove to yourself Sylvania standard fluorescents deliver more light, cost less. And if you care to measure lumens output during lamp life, you'll find Sylvania lamps burn brighter and longer.

That's why Sylvania backs up its statements with an exclusive money-back guarantee! Sylvania Fluorescents must give you more light at lower cost than any other brand—or cost you nothing!

Interested in learning more? Ask your Sylvania representative or supplier to see a copy of this revolutionary Sylvania Light Insurance Policy. Or write:

SYLVANIA LIGHTING PRODUCTS
Dept. 9L-7010, 60 Boston Street
Salem, Mass.
In Canada: Sylvania Electric (Canada) Ltd.
P. O. Box 1190, Station "O", Montreal 9

SYLVANIA
Subsidiary of
GENERAL TELEPHONE & ELECTRONICS

For more facts circle 655 on Reply Card

NEW PRODUCTS

(Begins on page 188)

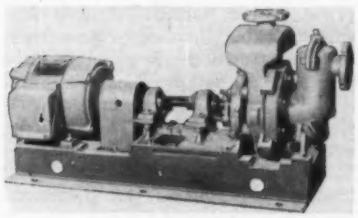
conventional thermal-magnetic trip unit, and a set of fuse holders is added. These holders are designed to accept standard N.E.C. fuses or current limiting fuses.

Switches rated at 400 or 600 amp are normally assembled to take single

fuses; 800-amp units to take parallel 400-amp fuses, and the 1200-amp units, parallel 600-amp fuses. A feature announced is teaseproof operation. The mechanism drives the contacts into position in less than one cycle. Switch enclosures feature knockouts on bottom, top, sides and back; a handle that accommodates three padlocks. Federal Pacific Electric Co.

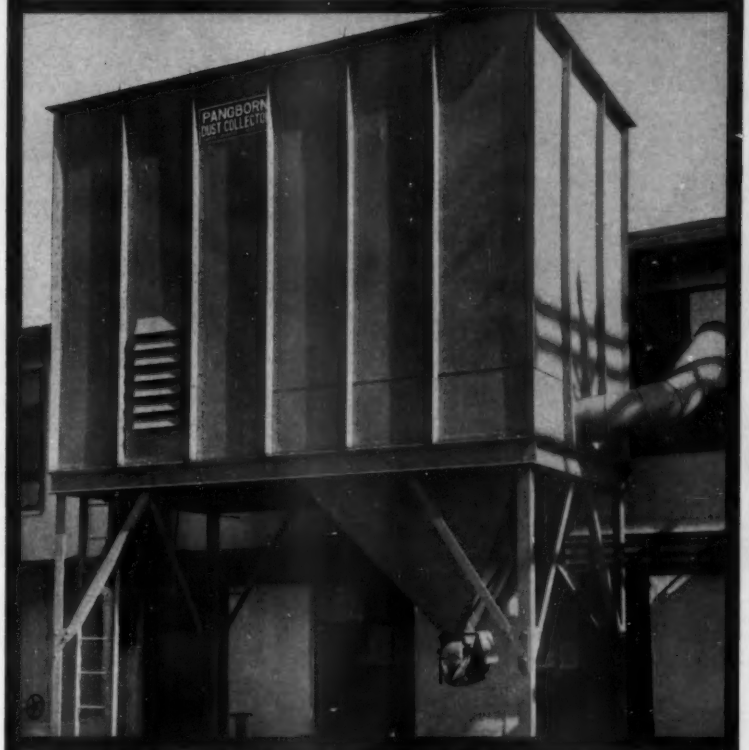
91—SELF-PRIMING PUMPS, choice of bearing stands

Centrifugal pumps in the AW Series are self-priming and feature a trap with a readily accessible and removable strainer. This top-suction-entrance trap holds the prime. The separator below the discharge opening is an integral part of the casing and designed so that the pump's overall



height is minimized. Of three types of bearing stands available, the one pictured is for medium service or average conditions. There's also a heavier duty unit in which much of the shaft is enclosed within the bearing stand, and a lighter bearing stand. All pumps in the series have capacities to 1000 gal, heads to 125 ft, sizes from 1 to 5 in. Because of the self-priming feature these pumps can be stationed above

TRAPS ALMOST 4 CU. FT. OF DUST PER WEEK



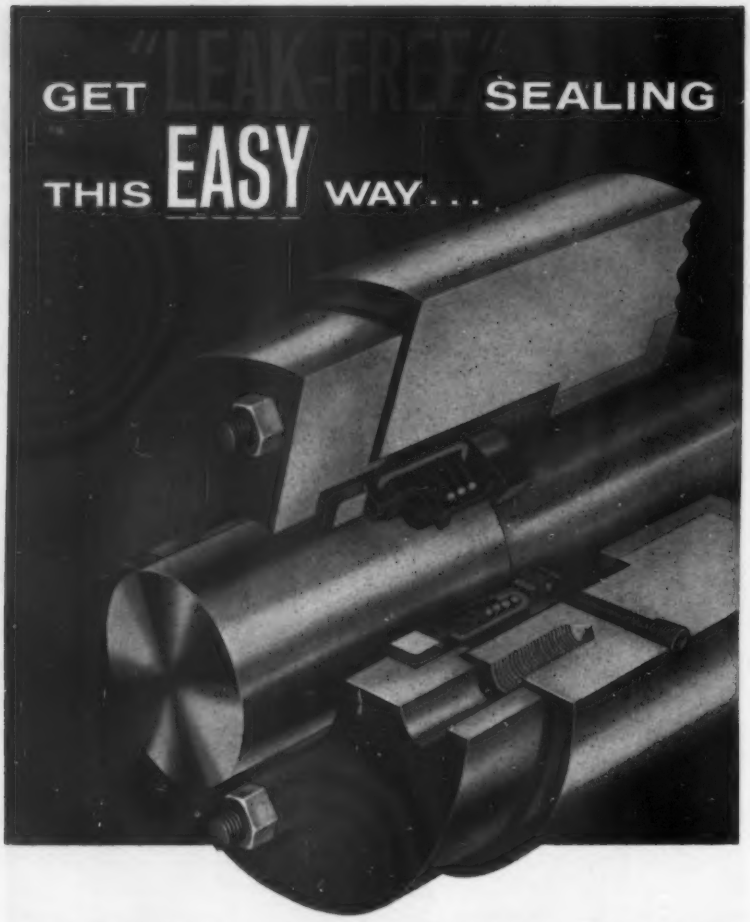
One small Pangborn Dust Control system replaces 8 collector units profitably at Precision Rubber Products

At Precision Rubber Products Corporation, Dayton, Ohio, millions of seals pass through a buffing process every year. The resulting dust could constitute an operating and housekeeping hazard. To facilitate dust control, the company replaced eight individual collector units with a central Pangborn Dust Control system. This installation saves floor space, operates quietly and gives efficient dust control (trapping almost 4 cu. ft. of rubber dust per week). Dust is now removed from *one* collector hopper instead of eight individual hoppers.

If dust is a problem in your plant, talk to the Pangborn man in your area or write PANGBORN CORPORATION, 3200 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control and Blast Cleaning Equipment—Rotoblast® Steel Shot and Grit.*

Pangborn CONTROLS DUST

For more facts circle 656 on Reply Card



GARLOCK MECHANICAL SEALS

Easy to install—Garlock's PK MECHANIPAK* is self-contained—no parts to "put together." Rotating portion simply slides onto shaft; stationary portion positions quickly into counterbore of gland.

Easy to maintain—Once Garlock's PK MECHANIPAK is installed, further adjustment is unnecessary. No parts of the seal move on the shaft or sleeve, eliminating wear on shaft . . . spring in seal maintains contact between sealing faces.

Easily cuts costs—Garlock's PK MECHANIPAK is designed to reduce maintenance and downtime, thus offers many dollar-saving benefits.

Available in shaft sizes from ⅜" to 3" . . . will operate at temperatures to 212°F, pressures to 150 psi, shaft speeds to 2000 fpm. PK MECHANIPAK Seals are another important part of the Garlock 2,000 . . . two thousand different styles of packings, gaskets, and seals for every need. Find out more from your local Garlock representative, or write for Catalog AD-150.

*Registered Trademark

THE GARLOCK PACKING COMPANY, Palmyra, N. Y.

For Prompt Service, contact one of our 26 sales offices and warehouses throughout the U.S. and Canada.

GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Molded and Extruded Rubber, Plastic Products

Canadian Division: The Garlock Packing Co. of Canada Ltd., Plastics Division: United States Gasket Company

For more facts circle 657 on Reply Card

NEW PRODUCTS

(Begins on page 188)

the liquid level. They are claimed ideal for handling corrosive liquids. Water-end parts are made of corrosion resistant metals. Form AW gives further details. Nagle Pumps, Inc.

214—ANCHOR eliminates protruding bolt obstacles

The Deco Anchor is flush with the floor until the actual installation of equipment or column is made—avoiding the constructon project hazards to personnel and mobile equipment caused by protruding bolts. The box-like fitting, attached to the top of the bolt contains an oblong nut, movable in all directions enough to compensate for any error in setting anchor bolts. The machine or column is attached to the cast-malleable fitting by

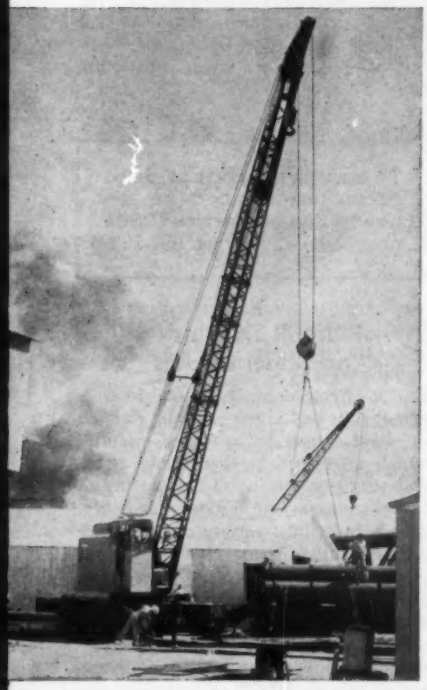
a stud of desired length, thus avoiding hoisting and lowering of machines over a fixed bolt by the trial and error method. A temporary washer is centered in the flush area of the casting to protect the movable nut during the pouring of concrete.

The anchor bolt is centered in the fitting when attaching to setting templates, and is claimed no more difficult to install than conventional anchor bolts, and the large flat surface of the casting provides an ideal arrangement for leveling the doweling where necessary. Deco Anchors are available in fittings only or complete with anchor bolt and stud in sizes from ⅜ to 1½ in. bolt diameters. Decatur Engineering Co.

215—BALL PEN INK for use on recording charts

Compounded especially for ball-pen application to recording instruments, this ink is claimed to eliminate impurities or air bubbles—major causes of poor pen performance. Other advantages announced for this ink are instant starting after long idle periods,

VERSATILE PLANT DUTIES: Sorting, loading, fabricating, erecting—this 300 series self-propelled crane (above) performs all kinds of jobs that demand precise load control. Left: An American DiesELectric Crane performs the dual work of loading and switching rail cars.



ON RAIL, ON GROUND—AMERICAN CRANES PRODUCE FAST, POWERFUL MATERIALS HANDLING SERVICE

Looking for the most efficient answer to your heavy-duty lifting and loading demands? Here it is: American Cranes, either on rail, rubber, or crawler. American Truck, Self-propelled and Crawler Cranes . . . capacities from 12½ to 60 tons . . . will meet all your requirements for mobility and speed. Moving easily in tight spots, or down narrow aisles with big loads, American Cranes were designed for *all* the tough jobs. Combined with any front, crane or excavator, they give you top performance on every move.

American DiesELectric* Locomotive Cranes, with capacities to 130 tons, that swing, travel, hoist, and raise or lower its boom (all at the same time, if necessary) will give you the ultimate in fast, efficient pin-point spotting. Detailed operating records show that American DiesELectric* Cranes can write off . . . work off . . . their initial cost in a few years. American Cranes are outstanding . . . just ask any owner. Or write us for detailed and illustrated information on American equipment that has served industry for more than three-quarters of a century.

*Trademark

DERRICKS-HOISTS to 800 tons
REVOLVER CRANES to 400 tons

EXCAVATORS-CRANES to 2 yds.-60 tons
LOCOMOTIVE CRANES to 130 tons

AMERICAN HOIST
and Derrick Company
St. Paul 7, Minnesota

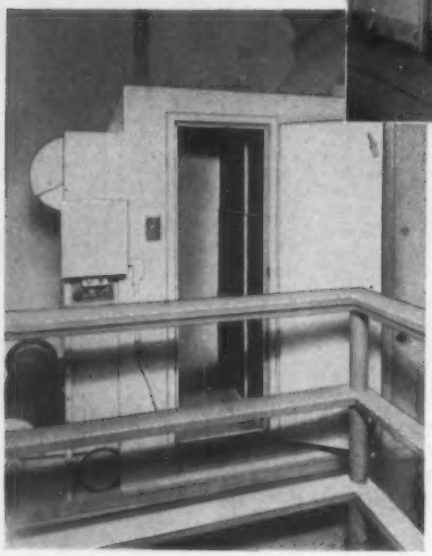
AMERICAN HOIST PACIFIC COMPANY
Special materials handling equipment

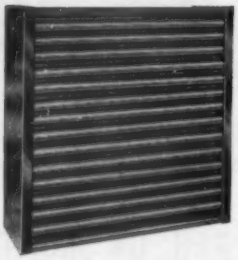
CROSBY-LAUGHLIN DIVISION
Drop forged fittings for wire rope-chain

For more facts circle 658 on Reply Card

HOW CONNOR dorex® *Protects* EXPENSIVE EQUIPMENT AGAINST CORROSIVE GASES

At the Linden Generating Station of Public Service Electric and Gas Company, Newark, New Jersey, Dorex Air Purification equipment protects the collector rings of the station's large generators from corrosive gases.





Two Dorex installations of six cells each prevent a destructive condition which would cause frequent, costly replacement of brushes and rings.

And in many other utility stations and industrial plants, Dorex guards expensive equipment against such destructive, contaminated gases as sulfur components, organic peroxides, nitrogen oxides, and chlorides . . . and protects personnel.

Dorex acts just like a gas mask, using activated carbon to adsorb air-entrained pollutants. The carbon's purging action purifies the air and readies it for sanitary re-use. Dorex is easily adapted to new or existing duct systems, requiring no more engineering than that necessary for similar incorporation of standard dust filters.

Request new Dorex Bulletin 108A, and ask to have a Dorex representative call . . . Dorex equipment can be the efficient, economical solution to your air pollution problem.

CONNOR... for Constant Comfort Conditions

CONNOR ENGINEERING CORPORATION

DANBURY • CONNECTICUT

dorex® air recovery

For more facts circle 659 on Reply Card

NEW PRODUCTS

(Begins on page 188)

operation at high ambient temperatures light point pressure, good photocopying characteristics and good high or low chart speed performance. It comes in a wide choice of colors. Formulabs, Inc.

216—SUMP PUMP MOTORS for heavy duty jobs

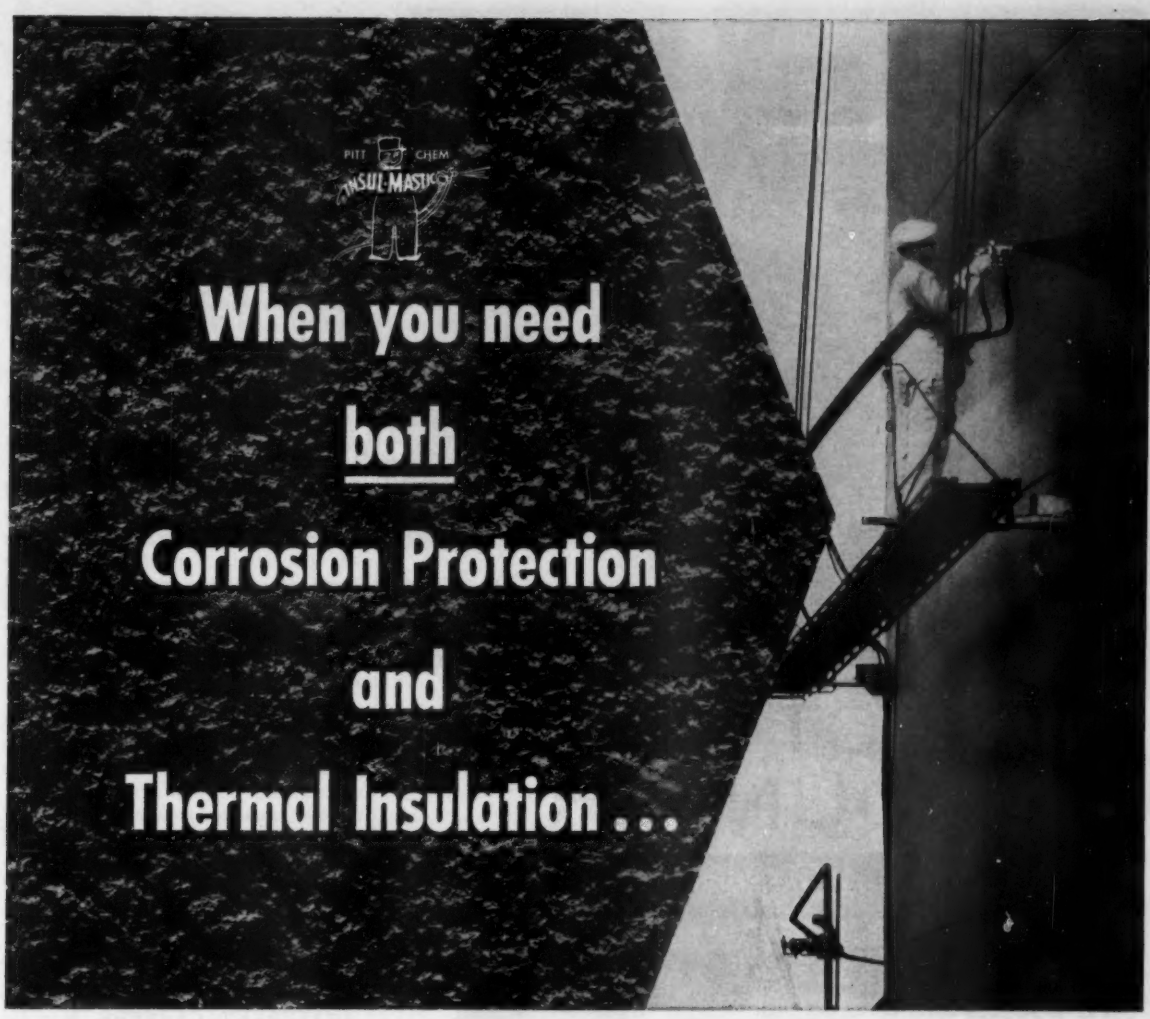
Heavy duty motors in ratings of ½, ¾ and 1 hp, capacitor start, induction run types for sump pumps, have been added to this company's Submatic line. These higher horsepower

motors are sealed in a bronze case serving as a switch-actuating float to operate in and under water, the level of which determines the on-off position of the contained switch. Franklin Electric Co., Inc.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 287-288.

217—PRIMER for rusted iron and steel surfaces

For its effectivenes, Rustikote depends principally on a new vehicle claimed to have superior wetting qualities which enable it to thoroughly penetrate the rust and bond the coating to the base metal for greater durability. Finish coats in a variety of colors are available. Rustikote is for use right over tightly clinging rust after loose rust has been removed by scraping or wire brushing. It is described as an answer to the problem of rusted surfaces in applications where sandblasting or other methods of complete rust removal are too costly or impractical. Tests are reported to indicate good surface protection and superior life expectancy. Tropical Paint Co.



. . . specify PITT CHEM *Insul-Mastic* 553

Do you have a corrosion problem that requires the protection of a heavy duty coating *plus* a degree of thermal insulation? You can solve it efficiently and economically with a *single* coating—*Insul-Mastic 553.*

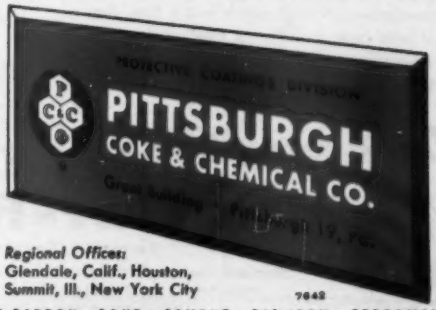
This tough, durable mastic contains a high percentage of granulated cork. Applied to a 3/8" thickness, it will reduce heat loss through steel plates 40 to 65% . . . and provide excellent condensation control.

Because it is formulated with mica and a high percentage of Gilsonite, Insul-Mastic 553 is virtually unaffected by acids, alkalis, moisture and weather. It can be spray-applied in one continuous, uniform coating to metal, masonry or ceramic surfaces.

Refrigeration tanks, metal roofs, piping and metal sidings are just a few of the places where you can stop corrosion, reduce heat losses and prevent condensation with Insul-Mastic 553. *Call your Pitt Chem Distributor for full information and recommendations, today!*

PITT CHEM Industrial Coatings are available through leading Industrial Distributors. See the "Yellow Pages."

★ PITT CHEM "Insul-Mastic"® Gilsonite-Asphalt Coatings
★ PITT CHEM "Tarset"® Coal Tar-Epoxy Resin Coatings
★ PITT CHEM "Tarmastic"® Coal Tar Coatings



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For more facts circle 660 on Reply Card

NEW

ELECTRONIC COUNTER

Designed for High Speed and Accuracy

AT LOW COST

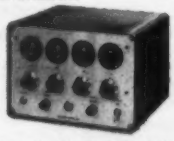
Veeder-Root's new Series 1697 Count/Pak is an economical device for high velocity, non-contact counting in a wide variety of production and packaging operations.

Features include a transistorized circuit with photoelectric sensing system; speed up to 2500 counts per minute with absolute accuracy; rugged and reliable construction; and exclusive Veeder-Root instant reset, high speed electric counter for dependability and long life.

Send for complete details. This new Count/Pak is ideal for *Count*rol of packaging, bottling, food processing, materials handling, conveyor lines, paper, plastic, and pharmaceuticals — to name but a few. See how it can help you bring cost-savings to your operations with easy-to-obtain "facts-in-figures".

Plus — These Electric and Electronic *Predetermining* Counters

Electric Predetermining Counter with Automatic Reset. Used for slow speed counting (up to 1000 CPM), batching, materials handling, length measurement. Can be modified for automatic sequential predetermining using two or more preset numbers. Totalizer counter available.



Electronic Predetermining Counter. For high speed batching and counting. Instantaneous reset, automatic recycling, up to 5000 counts per second!

2, 3, 4, 5 or 6 decade counters available, with or without sequential predetermining feature and totalizer counter.

"The Name that Counts"

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For more facts circle 661 on Reply Card

NEW BOOKS

for the plant engineer

On Materials Handling

ENGINEERING AND PURCHASING PLANBOOK. Size 11 by 8½ in. approx; 120 pp; illustrated; paper bound. Published by the Caster and Floor Truck Manufacturers' Association, 27 East Monroe St., Chicago 3, Ill. Price $3.75 prepaid and $4.00 invoiced.

IN THIS TIME of automation the term "nonpowered" applied to materials handling equipment may not sound sophisticated or glamorous. Yet this type of equipment and related accessories are basically important to materials handling needs. Ten areas of application of nonpowered equipment are pointed out and discussed in this manual which deals with buying and using materials handling items.

Some of the principal topics of discussion in this publication are as follows: wheels, casters, two-wheel trucks, platform trucks, towline trucks and trailers, and equipment payoff.

The manual includes details for standard specifications for manual materials handling equipment developed by Caster and Floor Truck Manufacturers' Association members.

Career Guidance

WHAT YOU CAN EARN IN 250 DIFFERENT CAREERS. Size 8¼ by 5½ in.; 175 pp including index. Published by Chilton Company, Book Division, 56th and Chestnut Sts., Philadelphia 39, Pa. Price $2.95, cloth bound; $2.50, paper bound.

ONE OF THE important decisions that all individuals have to consider deals with the determination of the type of work to follow to make a living. Advance guidance and a general study of the field of possibilities are, of course, a help in making occupational decisions. This book offers some assistance in that direction. It has information which may be of interest not only to people still attending educational institutions but to others.

Many occupations and professions are analyzed in this work engulfing engineering and various trades. Discussions bring out some of the functions in diverse fields of endeavor. Salaries are mentioned by individual professions and trade wages are mentioned collectively in table form.

Some of the areas to which the jobs that are analyzed pertain, are as fol-

NEW HONEYWELL CATALOG

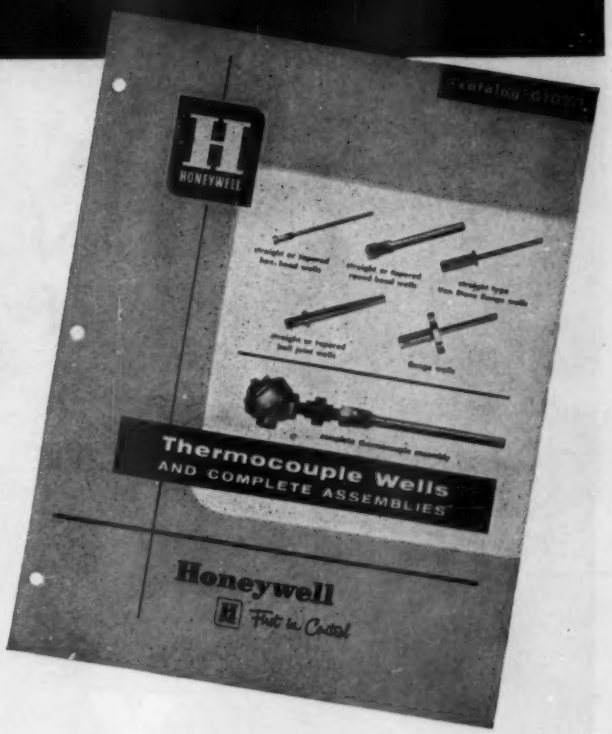
helps you choose the right

THERMOCOUPLE WELLS

Here's valuable help in the often-perplexing job of picking the right thermocouple wells and assemblies for particular applications.

This new Honeywell catalog brings you a wealth of useful data . . . provides all the information you need to make the right selection every time. Included in the catalog are:

- **Well designs and dimensions**
- **Pressure and temperature ratings**
- **Corrosion data**
- **Thermocouple assembly data**
- **Ordering and pricing information**



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NEW BOOKS

lows: advertising, medicine, mechanical engineering, drafting, maintenance, and building construction.

On Business Computers

PROGRAMMING BUSINESS COMPUTERS. Size 9¼ by 6⅛ in.; 510 pp including index; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N.Y. Price $10.25.

A POPULAR and fascinating topic of discussion today is "computers". Some people are interested in pursuing the subject more closely because they are exposed to computer work or perhaps they expect to be involved in work handled by such machines. This book can be of value to them and of interest to others.

At the beginning of the book, there are chapters dealing with fundamental information in which are discussed such items as: data processing functions; the organization of files; flow charts; and history of computing.

An explanation of the standard techniques of coding follows. Examples of coding are written in terms of a computer called DATAC which is a fictitious machine; however, the principles can be applied to real machines.

Among the more advanced topics that are explained in the book are the following: sorting; economizing and estimating computer time; rerun techniques; and large random access storage file. The book also includes material on the steps for planning and programming computer applications and a glossary of terms.

Engineers' Earnings

PROFESSIONAL ENGINEERS' INCOME AND SALARY SURVEY. Size 9 by 6 in.; 51 pp; illustrated; paper bound. Published by National Society of Professional Engineers, 2029 K Street, N.W., Washington 6, D.C. Price $1.00 — members, $2.00 — nonmembers.

THIS REPORT covers 1958 incomes of professional engineers. Over 18,000 returns were used to compile this study. The booklet tells how the survey was made.

Numerous charts are used in the publication to portray such information as median income by branch of engineering, by field of employment, by type of work performed, and by region from 1952 to 1958.

Considerable amount of tabled information appears in the appendix along with a sample of the questionnaire that was used in the survey.

One of the items brought out by the survey is the appearance of a continuing trend toward a lessening of certain types of income differentials. Median incomes of professional engineers reportedly rose to a record high in 1958.

On Statistics

ENGINEERING STATISTICS by A. H. Bowker and G. J. Lieberman. Size 9¼ by 6¼ in.; 585 pp including index; cloth bound. Published by Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N. Y. Price $11.00.

A COMBINATION of engineering and mathematics' experiences was a factor in preparing this book in which the application of statistical theory is discussed. Carefully chosen examples show how statistics can solve typical engineering problems.

It is recommended that prospective users of this book have a working knowledge of calculus for a better grasp of some of the material.

Beginning with an introduction to the basic fundamentals of probability and distribution theory, the book delves into many subjects. Among these are: the distribution of the

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Highly corrosive elements in processing system at Chemical Contour plant in Gardena, California, cannot harm this all-Penton ball valve (inset). A complete line of Penton valves is available from Chemtrol, Lynwood, California.

PENTON* handles jobs no metal can touch

Another example of the type of anticorrosion job that Penton does best is in the new process of chemical milling. In the heart of this processing system there's a Penton valve that has now been in operation for more than 10 months with no sign of failure. Installed in the drain line of a chemical milling tank, this Chemtrol ball valve is continually exposed to a 160°F. solution of concentrated nitric and hydrochloric acids with dissolved chloride salts and oxides. This bath is formulated specifically to eat away stainless steel, and the corrosive effect of these hot acids is apparent in the metal fittings surrounding the valve. But they haven't affected this all-Penton Chemtrol valve. It still looks and works like new—inside and out.

Penton outperforms other plastics, and even expensive metals, in many corrosive exposures involving high-working pressures and elevated temperatures. Now not only valves, but many other components for chemical processing systems are readily available. Pump parts, pipe, tubing, pipe fittings, and meter parts made with Penton permit the design of a complete Penton package for economical and efficient processing.

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*Penton is the Hercules registered trademark for chlorinated polyether.

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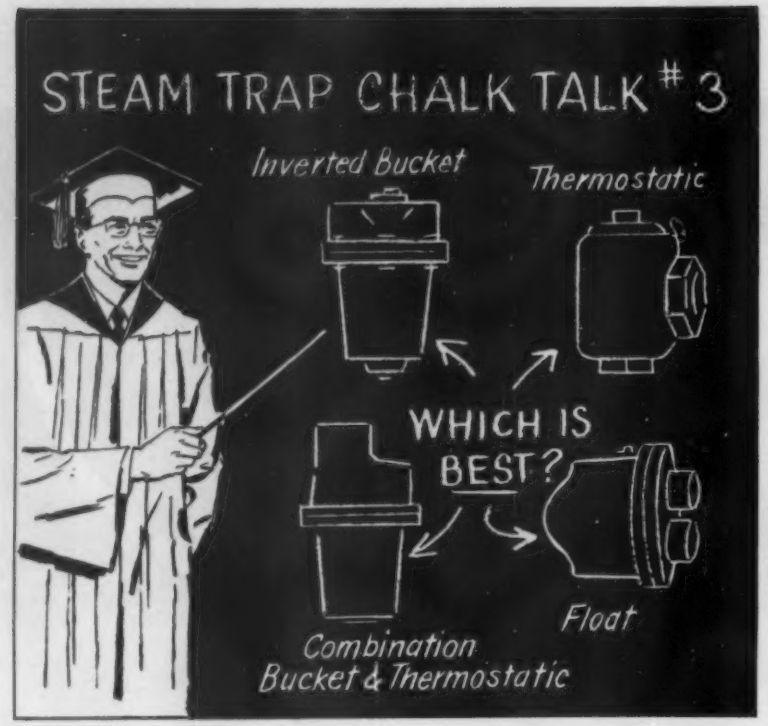

Is one trap design better than another?

● The steam trap user is often confused by the fact that there are four different designs of traps on the market. Is one better than another, and if so, which one should he use?

Actually, each design of trap has its place, *depending upon the application*. For example, thermostatic traps are preferred for chemical, petroleum and other outdoor applications because they cannot freeze. However, they do not compare in efficiency with inverted bucket traps for normal inside use. Where fast heating up is required, the combination bucket and thermostatic trap permits steam units to reach maximum heat 2½ times faster. For continuous service, float traps are best.

For sound recommendations, ask Anderson. Manufacturing a complete line of traps, in all designs, they give unbiased counsel. Their engineering catalog, "How to Select Steam Traps and Other Fluid Specialties" contains hundreds of worthwhile recommendations. Mail coupon for your copy today.

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NEW BOOKS

sample mean; the Chi-Square distribution; optimal estimates; least squares estimates of the slope and intercept; ascertaining linearity; analysis of the random effects model; and lot-by-lot sampling inspection by variables.

Answers to Wage Problems

WAGE ADMINISTRATION by Charles W. Brennan. Size 9¼ by 6¼ in.; 439 pp including index; cloth bound. Published by Richard D. Irwin, Inc., Homewood, Illinois. Price $8.10.

WAGE ADMINISTRATION is a challenging function with much responsibility. It deals with the human element and deserves serious consideration not only from the monetary standpoint but of the various factors which come into play.

Contained in this book is a great deal of information for the effective handling of problems in wage administration. Tools used in this field are explained and analyzed.

The book also covers briefly some of the historical background of wage administration and brings out the influences of trade unionism and the government on wage administration.

This book has five parts whose topics are as follows: introduction to wage administration; determination of relative worth of jobs; determination of going wage; wages and wage incentives; employee evaluation; control of the wage administration program; exercises in wage administration.

Additional information is included in the appendixes.

Plastics Application Series

Continuing their book series on the various families and applications of plastics, the Reinhold Publishing Corp., 430 Park Avenue, New York 22, N.Y., has issued two more of the volumes.

Each is a relatively short book, and matches its predecessors in size (7½ by 5½ in.)

PHENOLIC RESINS by David F. Gould; 213 pp including index; price $5.75.

This book covers what is probably the most varied and versatile group of synthetic resins in use today. Important members of the coal tar distillate family, phenols have found end uses in molding compounds, chemical equipment and adhesives. The latter is probably the most widespread, since the advent of laminates —in sheet form as well as the familiar laminated wooden structural beams.

Other applications discussed in the

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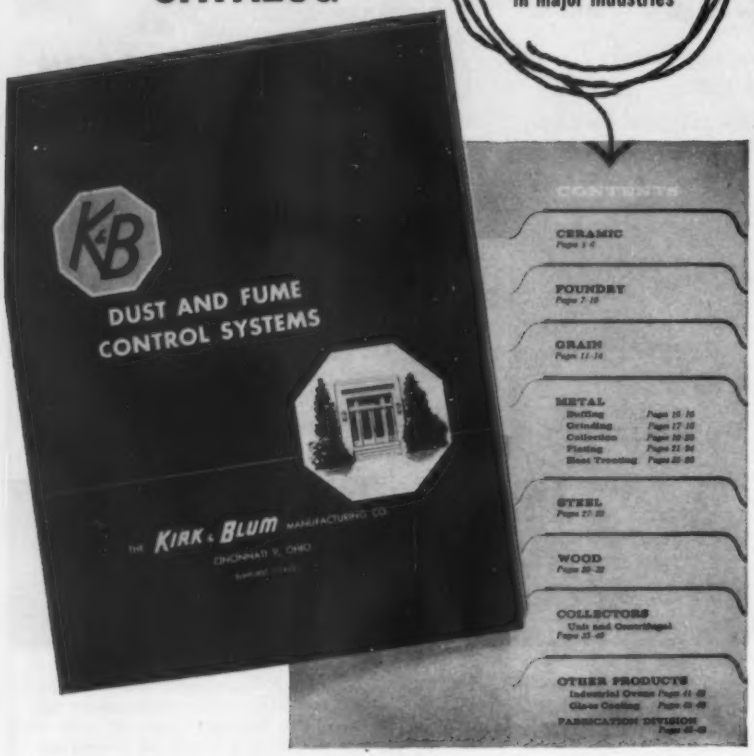

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NEW BOOKS

book include bonding and impregnating, coatings, castings, foams and rubber compounding with phenolics.

PLASTIC SHEET FORMING by Robert L. Butzko; 181 pp including index; price $4.50.

Gathering the information on the use of plastic sheet, the author presents an excellent summary of the field. He covers material selection, equipment, molds, sheet decoration and costs, for more than 14 different kinds of plastic sheet products.

Among the several plastics which the book presents as the basic raw materials for plastic sheet products are: acetates, vinyls, styrenes, polyethylenes and acrylics.

How To Predict Construction Costs

ESTIMATING CONSTRUCTION COSTS by R. L. Peurifoy. Size 6¼ by 9¼ in.; 446 pp including index; illustrated; cloth bound. Published by McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 36, N. Y. Price $10.75.

In extremely detailed exposition, the author breaks down construction costs into material, labor, equipment, overhead and profit.

While some of the material may not be of direct interest to the plant engineer—highway grading and excavating equipment operation not being an everyday problem in an industrial plant—the detailing of each type of construction job discussed gives the reader an excellent insight into the figures behind apparently "off the cuff" estimates of labor and material costs.

Extensive use of tabular presentation provides the reader with units of time and costs that can be readily applied to any project. Production rate tables give verified ranges instead of fixed rates, to enable the estimator to select the rates which apply to his particular project and area.

A variety of construction types is illustrated, with estimating examples for each. A rundown of some of the chapter headings will best describe the thorough coverage given to the field: concrete structures; floor systems; floor finishes; masonry; carpentry; lathing and plastering; painting; glass and glazing; roofing and flashing; plumbing; electric wiring; steel structures; and water and sewerage systems.

For a basic. detailed approach to estimating procedures, this book is a worthwhile handbook.

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High Frequency Lighting

(Continued from page 142)

first is the possibility of locating power factor correction inductors outside the area, reducing the heat contributed by capacitors to the air conditioning load to 1½ watts per pair of lamps.

Next is the possibility of obtaining more light per lamp, thus reducing the total lamp wattage needed for the entire installation. In our case, two lamps were used where three would have been required at 60 cycles. After taking all of those watt savings into consideration and converting them into tons of refrigeration, it may be possible to buy a smaller air conditioning unit. We saved five tons capacity in the original purchase of air conditioning equipment and will enjoy the additional economies resulting from operating this smaller unit.

Lighting levels were designed to maintain an average of 80 ft-c. After two years of operation covering 10,125 hours, footcandles had dropped to 64. During this period only four lamps had failed. In January, 1958, the acrylic diffusers were wiped clean but were not washed. The reflecting ceiling, built into the plenum above the lamps, was not touched.

At this time, the 596 lamps were replaced and lighting levels jumped from 64 ft-c to 77 maintained or just three footcandles below the original level.

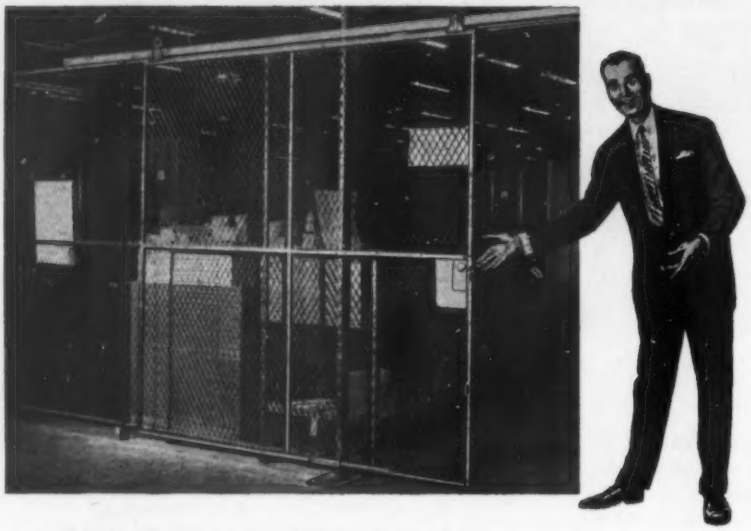
This was accomplished without washing the diffusers or cleaning the reflecting ceiling. Eventually, we will conduct tests that will include full cleaning of the equipment along with group replacement of the lamps.

Lamps Tested After Two Years

Lamps removed after two years of operation had been used on two circuits driven at 600 ma and 440 ma to provide uniform illumination throughout the office area. Six lamps from each of these circuits were selected for testing. Tests were conducted at 440 ma at 60 cycles since the original lamp ratings were based on this frequency.

Lamps from both groups produced 2110 lumens. This indicated a lumen depreciation of only 12 per cent after 10,125 hours of operation on 840 cycles. From these in-service tests it appears that useful lamp life is increased by about one-third with high frequency operation. **End**

Inexpensive to Buy —
Simple to Install — Easy to Maintain



Fact is, Phoenix Wire Mesh Partitions are economical from *every* standpoint. Your initial investment is held to a minimum because Phoenix can meet most any partitioning need from standard stock, and these, of course, are manufactured in low-cost production quantities (custom enclosures, incidentally, cost very little more). Then, there's installation and, frankly, it's so simple it can be handled on a do-it-yourself basis. Phoenix will, however, install anywhere in the U.S. Maintenance? Hardly a factor. An occasional dusting, a paint job from time to time and if somebody runs into it with a truck, the damage may be sufficient to warrant replacing a section . . . but beyond this wire mesh is virtually maintenance-free. Lasts for years and years, too, so look into it *today*. Send for a copy of Phoenix Bulletin #58 now!

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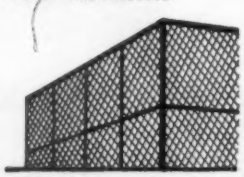

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"Rumor has it you're not satisfied with lighting conditions here—"

VIBRATION & NOISE CONTROL NEWS

FROM THE APPLICATION ENGINEERING DEPARTMENT OF THE KORFUND COMPANY, INC.

Resilient Mounts Offer Dual Protection — Greater Efficiency

Korfund's steel spring machinery mounts provide dual protection from damaging disturbance . . . They prevent transmission of shock and vibration from disturbance-creating equipment, ("positive" isolation) and they protect precision equipment from outside disturbance caused by other machinery, trucks, trains, etc. ("negative" isolation).

Isolators will often perform both jobs in one installation. For example, they will prevent transmission of vibration from a grinder taking a rough cut—then protect it against disturbance when taking precision cuts.

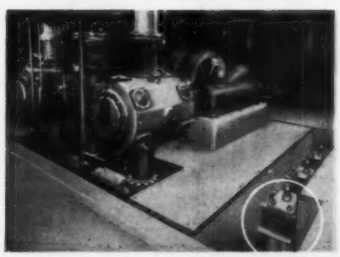
Dual protection, with effectiveness approaching 100%, is another reason why Korfund steel spring mountings are the first choice for critical installations.

Processing Firm Kills Damaging Vibration

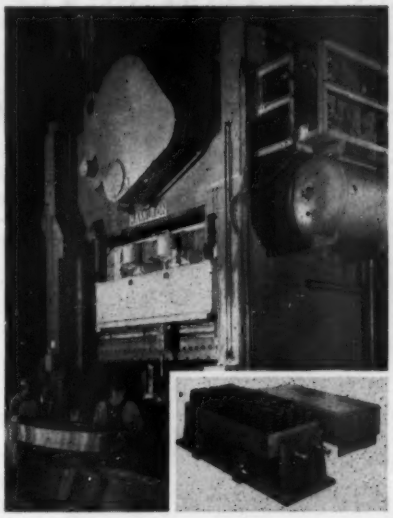
Delicate bacteria cultures upstairs — five heavy-duty, low speed horizontal duplex compressors downstairs — how do you keep structure-transmitted vibration from ruining precision processes?

Adding to this problem at Parke Davis & Company's Detroit plant was limited installation space, which compelled the foundations of the 250 hp machines to overlap the building column footings.

Korfund engineers floated each of the Ingersoll-Rand compressors and its foundation on four spring mounts. Snubbers limit machine movement. Vibration is so completely soaked up that lab workers are unaware when compressors are in operation.



SPRINGS CUSHION 1250 TON PRESS BLOWS. "SOCK" GOES INTO WORK, NOT INTO PLANT.



Impact from 1250 ton press is absorbed by special Korfund spring mounts weighing 2200 lbs. each. Despite tremendous forces involved, dynamic movement is less than 1/8", evidence of the excellent stability provided by the mounting system.

Slamming out auto frame parts from steel blanks is a tough job. And the shock that goes with it is tough on neighboring machines, building structure, operating crews, and the press itself.

Engineers at A. O. Smith Corp. in Milwaukee have studied this problem for many years. When planning the installation of a new 1250 ton capacity Hamilton press, truly effective shock absorption was required to cushion the 600,000 pounds of weight and mechanical force delivered at each blow.

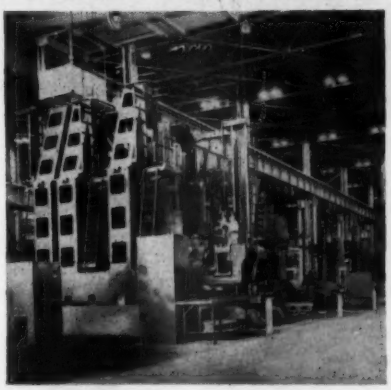
Korfund engineers "rode" the big press on special steel spring mountings (inset). It is now possible to stand close to the press, and feel no vibration or shock at the moment of impact. All the "sock" goes into the work where it belongs, and is kept out of the building structure.

At thousands of other plants, too, Korfund resilient mounts provide measureable benefits in lower maintenance and foundation costs, increased production and employee efficiency.

"Negative" Isolation Spells Positive Protection For Alcoa's Huge Die Sinkers

In the USAF Heavy Press Plant at Alcoa's Cleveland Works, precision die-sinkers automatically cut impressions into 100 ton steel die blocks. Though weighing 85 tons and mounted on 300 ton foundations, the giant Cincinnati Hydrotels and Pratt & Whitney Kellers — twelve machines in all — could be affected by shock and vibration from nearby forging hammers and presses. Dies worth tens of thousands of dollars demand precision work and absolute protection against these disturbances.

Work accuracy was insured by floating each giant die-sinker and its foundations on Korfund resilient mountings. Though the isolators provide several inches of static "cushion", there is no dynamic movement of the machines.



The same principle of "negative" isolation is applied to many other types of equipment, including furnaces, jig borers, roll grinders, sound-test rooms, instruments — even entire floors of a structure.

FOR MORE DATA OR SPECIFIC RECOMMENDATIONS WRITE TO KORFUND FOR BULLETIN #69

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Only the best goes into Armstrong Traps. Bodies are close grained 30,000 tensile iron castings or high quality forgings. Working parts are all tough, corrosion resistant stainless steel.

4. Good workmanship

Armstrong Traps are made by craftsmen who take pride in their work. Careful inspection and frequent checking insure the quality of the trap.

5. Application know-how

Your problem has probably been solved already in the extensive experience of the Armstrong engineering and sales organization. You can be sure of sound, dependable recommendations.

Your local Armstrong Representative can show you what Armstrong dependability can do for you. Call him today or write direct.

860 Series for low pressure heating service.

800 Series, side inlet, side outlet.

No. 801, side inlet, bottom outlet.

880 Series, integral strainer.

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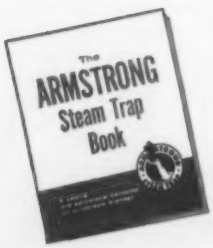

The 48 page Armstrong Steam Trap Book tells how to correctly size, install and maintain steam traps for any pressure, any temperature, any load plus full catalog data on Armstrong Steam Traps. Ask for Catalog K.

ARMSTRONG MACHINE WORKS

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See our catalog in Sweet's Plant Engineering File

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Plating Department

(Continued from page 147)

wastes permit much self neutralization of low pH acid effluent by mixing with the high pH alkaline wastes. Since each is expensive to treat, this arrangement is not only convenient but economical.

Without the limitation of an existing floor, it was possible to pour trenches, curbs, and tank piers integral with the floor. Keeping trench elevations low allow for future additions to sewers without costly built-up tank piers to maintain the proper drainage slope.

Acid proofing was used throughout the curbed areas and sumps with the material used being based on the temperatures and concentrations anticipated. Wooden ductboards cover the walk areas surrounding the tanks.

Our floor acid proofing consisted of a monolithic application of a modified - polyester - thermosetting plastic-binder compound resembling concrete but having a much higher resistance to abrasion than concrete. For strong caustic areas a modified epoxy with inert fillers, but similar to the above, was recommended and used. Vertical curb walls and trench walls were covered with a modified epoxy with silica fillers combined with a reinforcing fiber glass cloth.

Temperatures for these materials were specified at 190 F to 200 F but it has not been a serious consideration since at no time do we dump a large quantity of a hot solution without cutting and consequently cooling it.

Absolutely no dispersion of acid-laden air could be tolerated to the areas adjacent to the plating room. This necessitated room atmosphere control and thorough ventilation of each contributing tank. Tank ventilation was based on 200 cfm per square foot of tank area, regardless of the nature of the solution.

Acid-proofing materials used in our Finishing department for exhaust ducts was PVC wherever acid or strongly corrosive fumes were involved. A few of the larger runs were black iron pipe painted inside and out with acid-resistant paint. This piping handled non-corrosive fumes.

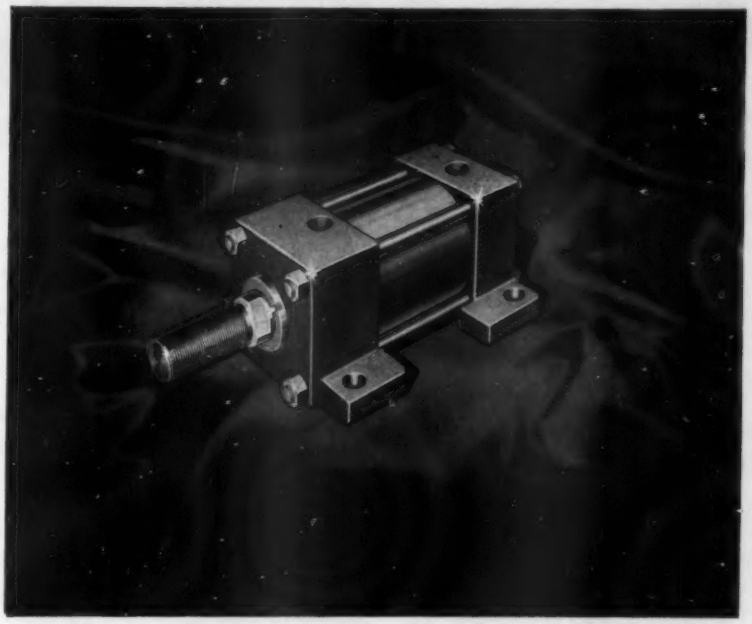
We had to use stainless steel hoods and ducts over the acid tank on the bright-dip operation, due to the high concentration of very corrosive fumes over this tank.

All structural members—trusses, columns, equipment supports, etc., were painted with an acid-resistant finish coat.

In addition to the two main doors, other openings were required to take care of the total exhaust. These were designed to maintain a slight negative pressure in the plating room; hence, the possibility of outward migration of corrosive air was eliminated. **End**

Want Tear Sheets?

If you would like tear sheets of any articles appearing in this issue, don't rip this magazine apart; others may want to read it. Just drop a line to The Editor, Plant Engineering, 308 East James St., Barrington, Ill. We'll be glad to send them just as long as the supply lasts.



Illustrated—Logan Super-Matic Cylinder Meets J.I.C. Standards

Look to Logan

the ultimate in hydraulic cylinder design

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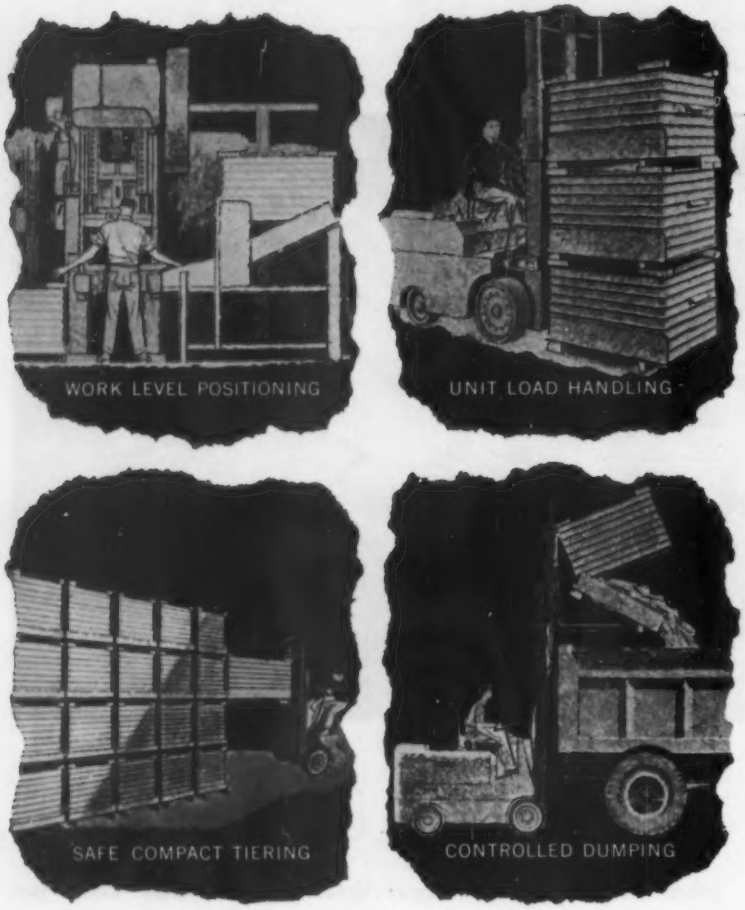
work·O·matic handling system

offers you increased production at lower cost



Get the complete story on this cost-cutting material handling system by contacting The Union Metal Manufacturing Company, Canton 5, Ohio.

UNION METAL

Material Handling Equipment

For more facts circle 673 on Reply Card

Torch Gouges Hole in Steel

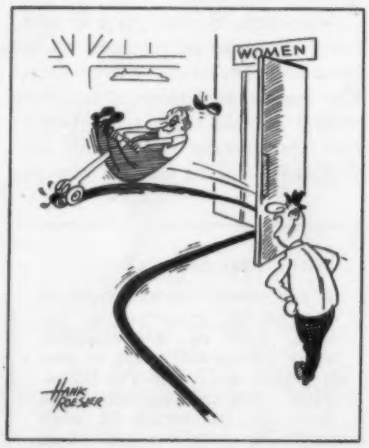
(Continued from page 111)

torch blows the metal melted by the arc away from the worked surface, it was necessary on this job to equip the operator with special clothing — asbestos apron, gloves and sleeves. Other protective clothing included overalls, caps and boots.

After the 10-in. diameter cuts were completed in the two hot cell doors, steel sleeves were fitted into place and tack welded. Lead-wool was then packed between the sleeve and the opening in the door to complete the seal.

The sleeve is of a stepped design, which will prevent the escape of radiation when the access plugs are placed into position. Because the radiation can travel only in a straight line, the 90 degree offset of the sleeve stops their travel into the outer chamber. After the sleeves were welded into place, the matching metal plugs of the same length as the door thickness were placed into position.

The entire job was completed in less than one weeks time. Actual work time with the arc torch was far less than 25 hours, even though the torch operator was unfamiliar with the equipment when the job was begun. A 1200-amp motor generator type welding machine supplied the necessary electrical current for the torch. Compressed air was used with the heavy duty torch. Electrodes of ½ in. diameter, d-c type copperclad carbon-graphite were used. **End**



"Won't you ever learn where to draw the line?"

NEW ACCURACY

for industrial remote control

LEARTRON 60

Extreme accuracy — within ¼ degree • High frequency response — three times greater than obtained with conventional electrical equipment • Self-contained — simple and easy to install, operate and maintain • Complete versatility — readily adaptable to all phases of industry • Operates on 115 V, 60 cycle power.

MACHINE TOOLS
MATERIAL HANDLING
CONTROL MODULATION
PACKAGING
TESTING
HAZARDOUS PROCESSES
SPEED CONTROL
FLUID TRANSMISSION

Lear magnetic powder clutch

LPS-60 RATED
250 IN. LBS. AT 12 R.P.M.
OTHER SIZES AND RATINGS AVAILABLE

LEARN HOW THE LEARTRON 60 PRECISION REMOTE CONTROL SAVES TIME, MONEY AND MANPOWER. WRITE . . .

LEAR G-7

ELECTRO-MECHANICAL DIVISION

110 IONIA AVENUE, N.W. • GRAND RAPIDS, MICHIGAN

For more facts circle 674 on Reply Card

New Plant Construction

(Continued from page 158)

at its Baltimore complex here, to speed development of high-temperature metals for jet engines, rockets and missiles, atomic power generators and other hardware of advanced design. Installation scheduled for the fall of 1960 will contain equipment to forge, extrude, roll, draw and heat-treat refractory metals.

Leominster, Mass.—Foster Grant Company, Inc., plans to construct a $1-million research center. Work on the new facility will begin at once for scheduled completion by late 1960.

Aberdeen, Miss.—American Potash & Chemical Corp., W. 6th St. at Westmoreland, Los Angeles, Calif., plans to increase capacity of its sodium chlorate plant here by approximately 50 per cent. Cost of the expansion will be approximately $1.3 million. Construction has already begun and will be completed by October, 1960.

Kansas City, Mo.—Western Electric Co. will start construction at once on a $12-million electronic equipment plant near here. Plant is scheduled for completion the first half of 1962 and when completed will employ more than 2500 workers.

Elizabeth, N. J.—Reichhold Chemicals, Inc., 523 N. Broadway, White Plains, N. Y., plans to construct a $4-million plant to make maleic anhydride, a chemical used in the manufacture of synthetic resins, paper sizes, plasticizers and other chemical products. Work on preliminary plans is already under way and the new facility is expected to be in production by the summer of 1960.

Williston, N. D.—Dakota Salt & Chemical Co., a subsidiary of General Carbon & Chemical Corp., Lake Forest, Ill., plans to construct an evaporative salt plant and a liquid petroleum gas storage depot. The salt plant will have an annual capacity of 80,000 tons. The storage depot will operate on a fee basis to serve bulk distributors of propane, butane and petroleum hydrocarbons in the United States and Canada.

Holmesville, O.—Addressograph-Multigraph Corp., 1251 Babbitt Road, Cleveland, O., will begin construction immediately on a chemical processing plant to be erected on a 59-acre building site, located here. The new unit, scheduled to be completed in about 10 months, will house offices of the company, production facilities, and a laboratory for the processing of solutions used in the office duplicating machines. New plant will be owned and operated by the Buckeye Ribbon & Carbon Co., a wholly-owned subsidiary of Addressograph. Total investment in plant and building will exceed $2 million.

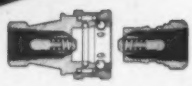
Marcus Hook, Pa.—Sun Oil Co., Walnut and 16th Streets, Philadelphia, Pa., plans to construct a $2-million propylene production facility at its local refinery here. Scheduled to go on stream early in 1960, the new plant is designed

Hydraulic and pneumatic lines are quickly and easily connected with Hansen Two-Way Shut-Off Couplings. No tools required.

When Coupling is disconnected, valves contact valve seats in both Socket and Plug to provide instant and positive seal of fluid in both ends of line. Coupling does not depend upon line pressure to seal either end of line.

Six sizes are available, with female pipe thread connections from 1/8" to 1" respectively. Furnished either in steel or brass.

Representatives in Principal Cities ... See Yellow Pages



Instantly shuts off both sides of line... prevents loss of liquid, gas or pressure.

Quick-Connective Fluid Line Couplings for

COMPRESSED AIR • OIL
GREASE • HYDRAULIC FLUIDS
WATER • VACUUM • STEAM
OXYGEN • ACETYLENE
REFRIGERANTS • GASOLINE
COOLANTS • LP-GAS

Write for the Hansen Catalog

Here is an always ready reference when you want information on couplings in a hurry. Lists complete range of sizes and types of Hansen One-Way Shut-Off, Two-Way Shut-Off, and Straight-Through Couplings.

SINCE 1915 — QUICK-CONNECTIVE FLUID LINE COUPLINGS

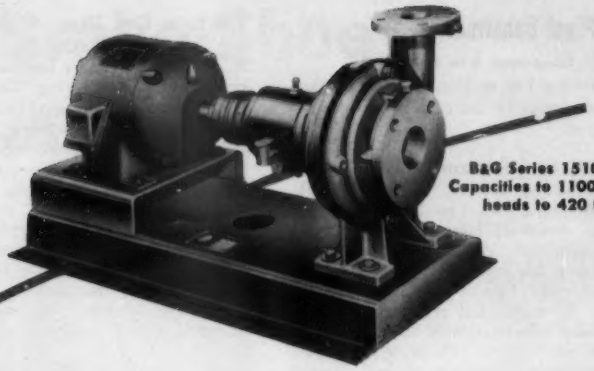
THE HANSEN MANUFACTURING COMPANY

4031 WEST 150th STREET • CLEVELAND 35, OHIO

For more facts circle 675 on Reply Card

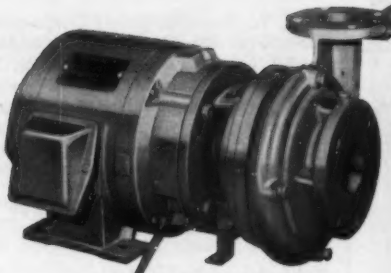
"OK. I'll send a man right over. Which press is out of order? The 50, 100, or 200 ton press?"

A GREAT LINE OF PUMPS ALL EQUIPPED WITH THE...

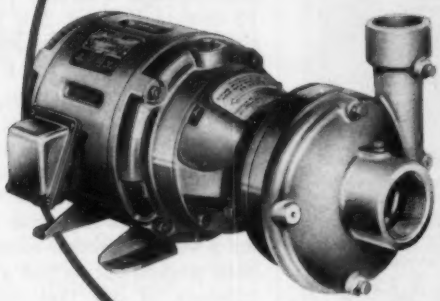


B&G Series 1510-B. Capacities to 1100 GPM, heads to 420 ft.

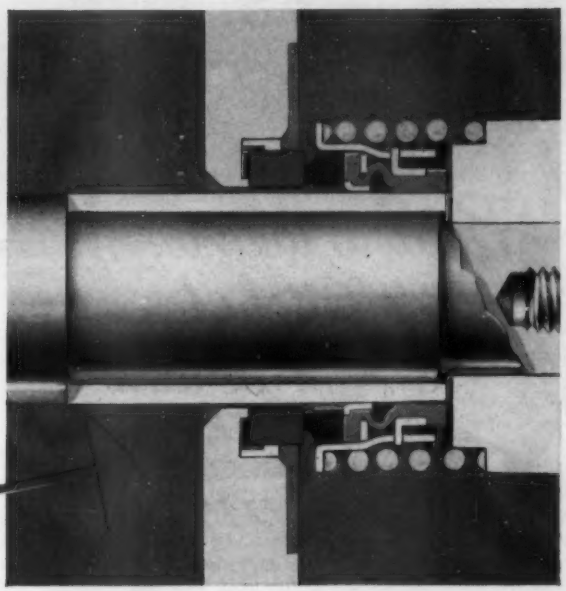
B&G "Remite"®
MECHANICAL SEAL
...an exclusive feature for leakproof operation



B&G Series 1531-B. Capacities to 1500 GPM, heads to 420 ft.



B&G Series 1522. Capacities to 150 GPM, heads to 115 ft.



Take just a moment to examine the design features of B&G Centrifugal Pumps. You'll find plenty of reasons why these pumps are giving trouble-proof performance through long years of service.

Vertical split-case construction permits removal of the bearing bracket without disconnecting pipe lines or motor leads. Solid cast iron volutes, with support feet in larger units, effectively prevent piping strain on the motor.

The shafts of B&G Centrifugal Pumps are an outstanding feature. Made of special alloy steel, they are super-finished and oversized to keep deflection at a minimum. The "Remite" Mechanical Seal—a B&G development—positively prevents leakage...and impellers are soundly designed to maintain hydraulic balance. An oil lubrication system, instead of grease cups, assures continuous protection to the long bronze bearings.

Exclusive "Remite" Mechanical Seal

This B&G feature eliminates the customary leakage which occurs where a packing gland is used. A Carbon Seal Ring faces on a "Remite" floating seat—*a new type of material, so hard it will scratch glass—wear-proof and corrosion-resistant.* Metal parts are of steel, bronze or stainless steel, depending upon the type of service. The B&G Mechanical Seal is self-lubricating.

B&G Centrifugal Pumps are available as all-iron, bronze-fitted, all-bronze and stainless steel units and in capacities to cover a wide range of industrial applications.

IMMEDIATE DELIVERY
ON PUMPS IN FACTORY STOCK
Available in commonly used sizes—capacities to 320 GPM, heads to 140 ft. Send for catalog CSP-359.

BELL & GOSSETT
COMPANY
Dept. FX53, Morton Grove, Illinois

Canadian Licensee: S. A. Armstrong, Ltd., 1400 O'Connor Drive, Toronto 16, Ont.

For more facts circle 676 on Reply Card

New Plant Construction

(Continued from page 274)

to produce 120 million pounds of propylene annually with a purity of 99 per cent.

Whitemarsh Township, Pa.—McNeil Laboratories, Inc., 2900 N. 17th St., Philadelphia, Pa., has broken ground for a multi-million dollar plant on large site here. Work on the new unit, scheduled for completion by late 1960, has already begun and will provide space for expanded research, production and administrative facilities.

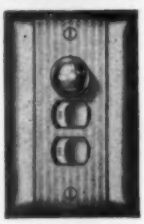
Salt Lake City, Utah—Kennecott Copper Corp., 161 E. 42nd St., New York, N. Y. has awarded a contract to Western Knall Engineering Co., 760 Folsom St., San Francisco, Calif., to engineer part of a proposed $10-million expansion and improvement program for company's Utah copper division smelter. Engineering firm will study proposed conversion of the smelter's pre-roasting process to a direct smelting process and also the proposed modernization of the materials handling system, enlargement and modernization of the three reverberatory furnaces and installation of new waste heat boilers. Work on these studies will begin at once for completion by mid-1961.

Tacoma, Wash.—St. Regis Paper Co., 75 E. 45th St., New York, N. Y., plans to construct a kraft paper and paperboard machine at company's mill located here. Total outlay for this work will involve the expenditure of approximately $30 million. New machine will have an initial daily capacity of 350 tons of kraft paper and board and will raise the rated annual capacity of the mill to 250,000 tons.

Neal, W. Va.—Navamont Corporation, subsidiary of Montecatini Chemical Co., 2 Broadway, New York, N. Y., and Milan, Italy, plans to construct a plant for the manufacture of polypropylene and other petrochemicals. Plans include installation of a large research and engineering section and power plant. Work is already under way on the $10-million project and will be completed some time in 1962.

Built to take it... Indefinitely!

THE NEW P&S ROCKER-GLO SWITCH



Available in Despard interchangeable type, Despard Type mounted on strap and narrow rocker for tumbler switch plates. A specification grade switch, 15 and 20 amps. 120/277 volts AC.

Here is a switch that can take it . . . and come back for more. Install Rocker-Glo in the most used and abused stations in institutional, commercial or factory building. Then watch its continuous, perfect, satin-smooth performance.

P&S Rocker-Glo switches are AC switches, designed to be used at full current ratings on tungsten filament and fluorescent loads — one does the work of two AC-DC switches for controlling fluorescent fixtures. Rocker-Glo can be used anywhere old-style toggle switches are used. Rocker-Glo is sturdily constructed. Its rugged, wall-hugging rocker is not subject to breakage from accidental blows as is the case with ordinary switch handles. It's built to withstand punishment ordinary toggle or specialty switches cannot take — changes no wiring habits. Single Pole and Double Pole switches are indicating — you can tell when they're on or off.

For more information write Dept. PE-1059

P&S

PASS & SEYMOUR, INC.

SYRACUSE 9, NEW YORK

60 E. 42nd St., New York 17, N.Y. 1440 N. Pulaski Rd., Chicago 51, Ill.

In Canada, Renfrew Electric Limited, Renfrew, Ontario

MAKE THE COMPLETE JOB COMPLETELY P&S

For more facts circle 677 on Reply Card

Refrigerated Paint Holders

(Continued from page 145)

pass through a baking oven for a 15 minute bake at 230 F, or are given a 24-hr air dry before handling. By this time, the FR Primer has reached its maximum glass-like and impervious hardness.

Though it has been determined that the 35 F temperature maintained in the dip tank will keep the FR Primer in usable condition for a week, a process technique has been worked out so that a complete turnover of dip tank contents is assured once every 24 hr. This is accomplished by using the remainder of the dip tank contents each morning to fill the paint pots used for hand spraying panels too large for dipping. The dip tank is then filled with a newly mixed lot of primer. However this technique may have to be altered as plans for a much larger refrigerated dip tank are now afoot.

The success of this installation has inspired Carr to design and apply for a patent on a refrigerated paint pot in addition to the process described in this article.

According to representatives from several large painting equipment supply firms, the Douglas refrigerated dip tank is a "first" in the field for the application of catalyst-type finishing materials, and will promote much wider use of these highly resistant but hard-to-handle polymerizing finishing materials. **End**

How American Brake Shoe Maximates Production

When the American Brake Shoe Company began an extensive modernization program at its New Castle, Delaware plant, one of the first steps management took to maximate production—that is achieve maximum output at less cost—was to install a Hoffman pneumatic conveying system for keeping bentonite, dextrin, silica flour and other materials *on the flow*. With a Hoffman exhauster furnishing the air as well as suction for the handling system, and use of components described here, the equipment not only simplified bulk conveying chores but paid its way in a few months by providing substantial production, material and labor savings.

MATERIAL INTAKE VALVE

Materials are introduced into the air stream through a unique nonclogging intake valve attached to the bottom of a hopper and flow smoothly through pipe lines to any one of six primary cyclone storage tanks more than 350′ distant. Hoffman intake valves insure the uninterrupted flow of dry, powdery or granular materials through all types of vacuum conveying systems. Suitable for use with 2″ through 6″ pipelines, they are equipped with standard 8″ flanges and can be easily attached to bins, hoppers, or dust collectors. Connected equipment is protected from exposure to the full suction of the system by a separate air inlet. The material handling rate can be adjusted while air is flowing. Thorough mixing insures smooth transit.

HINGE VALVE

Self-cleaning Hoffman hinge-type discharge valves are designed for air-tight closure against a head of material. The one-piece valve body is cast of gray iron with its rubber-faced disc and seat completely inside the casing. Lever linkage permits operation by means of chain or cable from a remote station. Provision can also be made for air or hydraulic cylinder actuation of the valve.

A portion of the Hoffco-Veyor system installed at the American Brake Shoe Co. plant in New Castle, Delaware.

ROTARY VALVE

Chain driven rotary discharge valves of cast semi-steel construction feed the material in controlled quantities. Designed for interchangeability of various types of fabricated and cast rotors, valves are equipped with torque limiting drive sprockets for protection against jamming and overloading. Equalizing connections permit attachment of bleed lines to vacuum or pressure source. Inspection of the interior can be made through an access port without disassembly of the valve.

PERISTALTIC VALVE

Controlled expansion and contraction of rubber diaphragms permit discharge in measured quantities. Since there are no internal moving parts, even coarse abrasives can be handled with minimum wear. Sheet rubber diaphragms are easily replaced whenever necessary.

COMPETITIVE ADVANTAGES

In handling quantities of dry, free-flowing powdery and granular materials such as sand, shot, chemicals, etc., Hoffco-veyor systems and components speed production—provide many genuine benefits and advantages which are reflected in higher profit margins. These include:

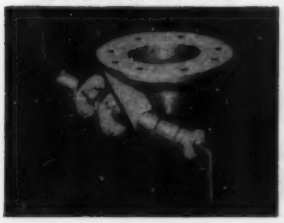
- flexibility
- cleanliness
- time saving
- lower initial cost
- easy installation
- material saving
- labor saving
- pay for themselves

FREE ENGINEERING SERVICE

If you have a materials handling problem, you can solve it with either a complete Hoffman system or any of its parts which may be purchased separately to fit your needs. Available equipment includes dependable centrifugal blowers/exhausters, cyclones, collectors, material intake, hinge, rotary, butterfly and peristaltic valves as well as filter bag collectors. We'll be glad to make a free engineering survey to determine how you can improve your manufacturing methods by maximating production with a really tight method of material handling. Send now for a free descriptive booklet. Please write:

Air Appliance Division
Dept. EM
U. S. Hoffman Machinery Corp.
103 Fourth Avenue
New York 3, New York

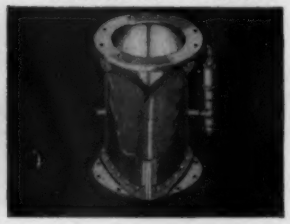
Material intake valve



Hinge valve

Rotary discharge valve

Peristaltic rubber valve



For more facts circle 678 on Reply Card

For more facts circle 679 on Reply Card

INDUSTRIAL FILMS

Electric Furnace Fume Control

CONTROL AND COLLECTION of dust and fume from electric steel furnace installations is covered in a new 16 mm color, sound movie produced by Wheelabrator Corp. The 20-minute film is available for program use in plants and at meetings of professional societies and organizations. A complete discussion of the desirability and advantages of control of fume from electric furnaces is presented. Diagrams and commentary are combined with photography of actual installations of control systems illustrating three types of hooding with the operation and advantages of each demonstrated.

For further information, write to Wheelabrator Corporation, Dust and Fume Division, 1133 S. Byrkit Street, Mishawaka, Indiana.

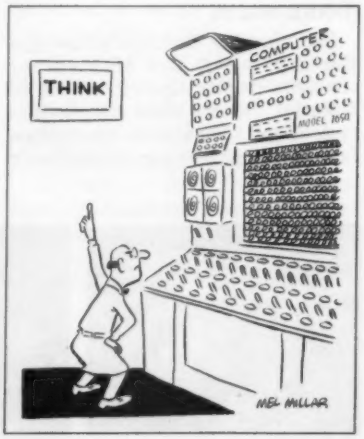
Film Catalog

A CATALOG of technical and industrial films, which are available on free loan cover subjects such as new industrial products, devices, tools, methods, new applications or new scientific findings. The films are specialized in content to attract the particular interest of engineers.

The Catalog of Business and Professional Films may be obtained by writing to Modern Talking Picture Service, Inc., 3 East 54th St., New York 22, N. Y.

Want To Know More About Corrosion? How to Prevent It?

CORROSION IN ACTION explains how corrosion occurs and what can be done to prevent it. Sponsored by the International Nickel Co., the three-part film is designed primarily for



Handling Hot Fumes? Bifurcate 'em!

A protective housing shields a DEBOTHEZAT Bifurcator motor from contact with hot and corrosive fumes. Special alloys for housings and fan wheels are available for extremely corrosive fumes. The result: smoother operation and lowered motor maintenance costs. In-the-duct installation of DEBOTHEZAT Bifurcator Fans saves valuable space and ends sharp-corner deflection of exhaust flow. Friction is reduced and velocity increased.

Direct-drive DEBOTHEZAT Bifurcator Fans economize fume removal problems in a wide variety of applications. Contact a DEBOTHEZAT engineer NOW.

De Bothezat FANS

A DIVISION OF

American Machine and Metals, Inc.

EAST MOLINE, ILLINOIS

FOR FURTHER INFORMATION ... SWEET'S ... OR WRITE FOR COPY

SEE OUR EXHIBIT AT 27th EXPOSITION OF CHEMICAL INDUSTRIES NOV. 30 - DEC. BOOTH [illegible]

IN CANADA: Represented by DOUGLAS ENGINEERING, LTD., Toronto • Montreal

For more facts circle 680 on Reply Card

INDUSTRIAL FILMS

technical, educational and industrial groups. The film was produced employing a variety of techniques, including animation, slow motion action and time-lapse photography, which shows in a few seconds time, the progressive result of years of corrosion.

The three parts of the film are: The Nature of Corrosion Anode and Cathode Processes; Origin and Characteristics of Corrosion Currents; and Passivity and Protective Films.

The first section gives a visual explanation of ion migration and describes also the electrochemical theory of corrosion, oxygen's role in corrosion, anodes and cathodes. Part two demonstrates by laboratory equipment and water analogies how differences in metals or in environment, may cause corrosion currents.

The third film in the group illustrates how special alloys may be created and used, protective coatings applied, or environment altered.

The films are mounted on three reels, but are shipped only as one unit. Total running time is approximately one hour. Films are loaned without charge and, mailing both ways is free. For additional information write to Rothacker, Inc., 729 Seventh Ave., New York 19, N. Y.

Foamed Plastic Insulation

METHODS of insulating pipes in industrial installations are described in this sound-color strip film. The 35 mm film strip, titled "Insulating With Plastic," runs approximately 18 minutes.

The film traces the development of flexible foamed plastic insulation, describes its properties and shows a number of application techniques used in actual installations throughout the country.

Approximately 45 case histories of all kinds of jobs in the industrial, air conditioning, refrigerating and plumbing and heating fields are shown in the film. In addition, case histories also include food processing and distribution buildings; institutional buildings; hospitals and schools; motels, hotels and apartment and office buildings; and residences.

This film is available through all Insulation Division field offices of Armstrong Cork Company and at the home office in Lancaster, Pa.

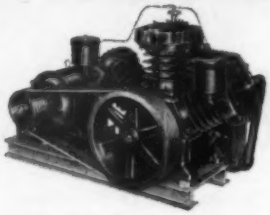
Vane Pumps

"POWER-UP," a new 16 mm, sound color film, which discusses the latest types of hydraulic vane-type pumps, is now available. It shows how power and efficiency of hydraulic circuits can be improved through the newest types of vane pumps, at pressures up to 2000 psi. Applications shown in this engineering film have particular importance to hydraulic systems designers of mobile equipment, field testing devices, and many types of

"I don't like snoopers."

Where the going is TOUGHEST the Curtis keeps going!

Sandiest FOUNDRY conditions haven't stopped this CURTIS AIR COMPRESSOR



The CURTIS C-100 two-stage air-cooled air compressor. 25-30-40 H.P.

- CURTIS-SEAL CRANKCASE
- TIMKEN MAIN BEARINGS
- SELF CENTRO-RING OILING
- AIR COOLED: NO COOL WATER REQUIRED
- PRECISION BUILT

For compressed air—industry depends on *Curtis*. Eliminate production line delays. Get more air faster . . . at lower cost. Where the going is toughest (foundry, factory or shipyard) put the CURTIS C-100 to work and forget it!—Full line of industrial compressors for ordinary and special applications.

For complete information write for illustrated folder.

OUR 105th YEAR

Curtis

MANUFACTURING COMPANY · PNEUMATIC DIVISION

Write Dept. 46, St. Louis 20, Missouri C-62

For more facts circle 681 on Reply Card

Easy to apply FOAMGLAS Stay-Dry Pipe Insulation covers 18,000 lineal feet of hot and cold pipe lines in the new Norton Building, Seattle, Washington. An additional 30,000 feet of FOAMGLAS insulation was used throughout the building for refrigerated surfaces, pump coverings and as backing for Spandrelite curtain wall panels on the building's exterior. Architect: Bindon & Wright. Consulting Architects: Skidmore, Owings & Merrill. Mechanical Engineers: Bouillon, Griffith & Christofferson.

18,000 FEET OF... NEW FOAMGLAS® STAY-DRY PIPE INSULATION won't let condensation form on these building service lines

Condensed moisture on building service piping can drip down and ruin costly interior finishes and furnishings. Consulting Engineers, Bouillon, Griffith and Christofferson found an excellent, low-cost solution to this problem in Pittsburgh Corning's new FOAMGLAS Stay-Dry Pipe Insulation . . . 18,000 lineal feet of it to insulate heating and air conditioning lines in the Norton Building, Seattle, Washington.

FOAMGLAS is a natural vapor barrier . . . composed entirely of sealed glass cells. And the air inside those cells is the world's best insulator. FOAMGLAS now is available in low-cost prefabricated 24″ pipe covering segments with a kraft-foil laminate jacket for a tough protective coating and attractive white outer finish. It can be painted with water base paints.

This unique combination of benefits . . . gives you cost-saving features not found in other commercial, dual-temperature pipe insulations: Easy to apply. No additional moisture seals or cut-offs required. No vapor barrier jacket required. High compressive strength. Easy to cut and shape. Cannot burn. Waterproof. Insulating value never varies. Moisture absorption is no problem. And it is vermin-proof.

It is available in 1″ and 1½″ nominal thicknesses . . . for all lines from ½″ copper tubing through 6″ I.P.S. for service from +35 °F to +350 °F. For more information on new FOAMGLAS Stay-Dry Pipe Insulation, write to: Pittsburgh Corning Corporation, Dept. PE-109, One Gateway Center, Pittsburgh 22, Pa. In Canada: 3333 Cavendish Blvd., Montreal, Quebec.

PITTSBURGH pc CORNING

For more facts circle 682 on Reply Card

New Way to Stop Faucet Leaks!

★ 9-in-10 washers are fastened with TOO LONG or SHORT SCREWS thus loosen and destroy themselves. Leaks quickly follow!

34 YEARS OF RESEARCH REVEALS NEW SOLUTION

★ New, patented 'Sexauer' SELF-LOCK screws have imbedded expanding NYLON PLUG. They lock at required depth AUTOMATICALLY, hold washers firmly! Made of MONEL, they are rustproof, non-corroding. Heads can't twist off. Screw slots can't distort.

★ NEW, improved 'Sexauer' EASY-TITE faucet washers are made of super-tough, pliable du Pont compound (not rubber or fibre). Reinforced, like a tire, with a vulcanized layer of Fiberglas, they resist distortion and splitting from shut-off grind and squeeze.

★ Faucet leaks repaired with 'Sexauer' EASY-TITE washers and SELF-LOCK screws outlast ordinary repairs "6-to-1"!

HIDDEN COSTS OF FAUCET LEAKS!

Hackensack, N.J. Water Co. and American Gas Association figures prove stopping just ONE PIN-HOLE SIZE (1/32") LEAK saves you 8,000 gal. water quarterly. A HOT WATER FAUCET LEAK repair saves you over $7.58 QUARTERLY in fuel and water bills. Fewer leaks also produce important savings on MATERIALS, LABOR and COSTLY FIXTURE REPLACEMENTS!

A 'Sexauer' Technician will make available our NEW Catalog, Edition "J", listing our entire line of over 3,000 TRIPLE-WEAR plumbing repair parts and tools. He will survey your fixtures, determine the repair parts needed and establish an efficient stock arrangement and control to prevent costly overstocking or shortages. You get this service without obligation. *Act now!*

J. A. Sexauer Mfg. Co., Inc., Dept. 9-109
2503-05 Third Ave., New York 51, N.Y.

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INDUSTRIAL FILMS

automatic and semi-automatic production machinery.

Running time of this new film is 12 minutes. A descriptive folder and order blank may be obtained from Denison Engineering Division, American Brake Shoe Co., 1160 Dublin Road, Columbus 16, Ohio.

Materials Handling

A 14-MINUTE-long motion picture features materials handling applications with a self-propelled crane-excavator. The movie, "The Bantam Method," is a 16 mm full color, sound production.

The movie was filmed on location at several industrial plant sites throughout the country where the excavators are used on various material handling operations. Actual on-the-job performance, engineering features, work range, job facts and production data are features on the film.

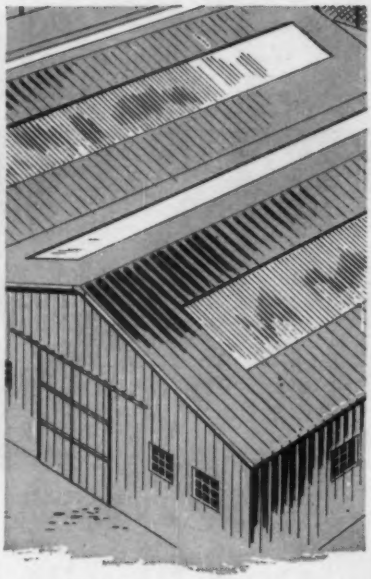
Private or group showings of the film can be arranged by contacting a Schield Bantam distributor or by writing directly to Schield Bantam Co., Waverly, Iowa.

Program on Lubrication

A LUBRICATION training series program on film is shown in four parts and covers the following subjects: Fundamentals of Lubrication; Characteristics and Classifications of Oils; Characteristics and Classifications of Greases; and Tests of Petroleum Lubricants.

The sound, slide film program is presented by company personnel from Sinclair Refining Co. Inquiries regard-

"Short somewhere?"



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- Best plastic panels you can buy! Longer life; up to 90% light transmission from new weather-tested resin bonded to superior quality fiberglass mat.
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Use new Stylux and save replacement costs over all other panels. Shatterproof, noncorrosive. Guaranteed uniform quality. Get literature, specs from your Building Supply Dealer, Glazing Contractor or write us direct.

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BUTLER
MANUFACTURING
COMPANY
Dept. 113, 7400 East 13th Street
Kansas City 26, Missouri

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Puritan's Engineered Maintenance reduces floor-cleaning and sealing problems for The American Thread Company

A Puritan representative demonstrates correct use of the Advance Floor Machine "Convertamatic" high speed combination scrubber-vacuum.

"We're saving 30% on costs... and our floors stay in better condition longer"

"ENGINEERED MAINTENANCE gets my vote! By applying technical know-how, furnishing adequate supervision, and providing proper supplies and equipment, Puritan has helped us lick a difficult sanitary maintenance problem.

"Frankly," says J. C. Collins, Utility Foreman at The American Thread Company, Sevier, North Carolina, "I didn't think we could ever overcome it, but Puritan showed us how. Now our custodians are proud of the job they are able to do."

The American Thread Company was faced with the problem of paraffin being tracked from area to area throughout its large, modern mill. With the installation of Puritan's ENGINEERED MAINTENANCE program, this condition has been reduced to a minimum with a very considerable saving in cost.

Systemized sanitation

Your plant has its own special requirements and desirable level of sanitary maintenance. The ENGINEERED MAINTENANCE program Puritan recommends for your company is prepared for your individual needs. A specially trained Puritan representative surveys your buildings personally. On the basis of this on-the-scenes report, a team of Puritan specialists prepares day-to-day, week-to-week and month-to-month procedures.

They set these up for you on an engineered basis...train your janitors and porters...call regularly to review progress and provide further training as needed.

This entire program costs you nothing

Puritan means exactly that. No strings. As a user of Puritan sanitary maintenance products you receive the service free.

Meanwhile you are not tieing yourself down in any way. Nationally used Puritan products are competitively priced and fully guaranteed. You are not asked to sign any long-term contract. You pay nothing extra—either directly or indirectly. The burden of proof is upon us.

Frees your time at once

ENGINEERED MAINTENANCE starts to take nuisance details off your hands from the very first day. You have additional hours to devote to management responsibilities... doubly important today when increased investments in labor, materials and equipment place a premium on efficient operation. ENGINEERED MAINTENANCE is a tested method of controlling sanitary maintenance...conveniently ...surely...economically.

A good way to start

Send for "ENGINEERED MAINTENANCE." This new technical booklet shows you precisely how Puritan helps you achieve trouble-free maintenance...cut your company's costs...save your own time.

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Clean, Strong, Unified Threads from lot to lot!

Assure interchangeability with bolts and nuts that fit as they should—uniform from fastener to fastener, order to order.

Our quality controlled bolts and nuts meet exacting tolerances for proper fits and strong connections. Smooth-turning threads assemble easily yet snugly, and give maximum holding power.

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America's Most Complete Line of Industrial Fasteners

INDUSTRIAL FILMS

ing the presentation should be made to H. Z. Given, Sinclair Refining Co., 600 Fifth Ave., New York 20, N. Y.

Product and Training Film Catalog

A CATALOG OF 47 product information films, training films and general interest films is available without charge from Westinghouse Electric Corp. The 16 mm sound films are for use by professional, civic and business groups. Complete information on the films is given in the 28-page booklet.

The general interest series includes films on atomic power, welding, switchgear testing and jet engine testing.

Product information series includes films on AB circuit breakers, induction heating, distribution transformers, disconnecting switches and others.

Some of the training films discuss electrical servicing of the air conditioning industry, motor maintenance and electrical control maintenance.

For a copy of booklet B-7077 write Westinghouse Electric Corp., P.O. Box 2099, Pittsburgh 30, Pa.

Mist-Painting

THIS 18-minute movie tells the story of Ransburg's No. 2 Process electrostatic hand gun. The film shows this new tool in operation, both in the laboratory and in in-plant production illustrations.

In-plant shots show the equipment in use on a variety of products, ranging in size and shape from long, outdoor lighting standards to toys . . . metal furniture . . . office partitions . . . water heater jackets . . . and small pieces of door hardware. Both conveyorized and non-conveyorized setups are shown.

The film—Guided Mist—is available for group showings. Write to Ransburg Electro-Coating Corporation, Box 23122, Indianapolis 23, Indiana, for available dates.

Air Conditioning and Human Efficiency

"AN ATMOSPHERE FOR PRODUCTIVITY" is a new film said to be the first of its kind in the air conditioning industry. It discusses facts on the relationship of temperature and humidity to human efficiency. The film is expected to be of interest to engineering and other professional societies as well as clubs. Further information can be obtained by writing to the York Corp., York, Pennsylvania.

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QUICK...SURE DOUBLE ACTION PUMPING

WAYNE DD-1 HAND PUMPS

Built to last longer . . . pump easier. They pump when pushed or pulled up to 20 gallons per minute . . . no waste motion.

WAYNE DD-1 Hand Pumps assure easy service in handling alcohol, lube oils, cutting fluids, gasoline, kerosene, fuel oil. Write for complete data folder to . . .

THE WAYNE PUMP COMPANY
Industrial Division
Fort Wayne 4, Indiana
Division of Symington Wayne Corp.

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Compact and completely pre-assembled, Inland Empire Paper Company's Package Air Preheater is ready to be connected to a 100,000 lb/hr boiler. This particular Package Air Preheater (incidentally a repeat order), measures approximately 10'x10'x8', and its 7000 square feet of effective heating surface will recover about 360° F. from the stack gas. Package design cuts installation time and costs drastically.

Here's why
Inland Empire Paper Co.
chose a

PACKAGE AIR PREHEATER

BIG INSTALLATION SAVINGS — AND FUEL SAVINGS THAT CAN PAY FOR THE AIR PREHEATER WITHIN TWO YEARS.

Inland Empire Paper Company, Millwood, Wash., makes these big savings with their Package Air Preheater:

1. Low-cost installation. That single unit on the truck is a *complete* Package Air Preheater. Once in place, and the ducts and power line hooked up, it will be ready to go—installed without erection in a fraction of the time required for conventional units.

2. Short-term write-off. Records of Package Air Preheaters operating all over the country prove that Inland Empire's Package unit can pay for itself in two years, just on fuel savings alone!

You get this double advantage with the Package Air Preheater because it's completely shop-assembled. And its compact design brings all the advantages of continuous regenerative heat recovery to boilers as small as 25,000 lbs of steam per hr—or as large as 250,000 lbs per hr.

There are other important advantages, too. Get the whole story by writing today for your free 14-page booklet with all the facts and figures.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

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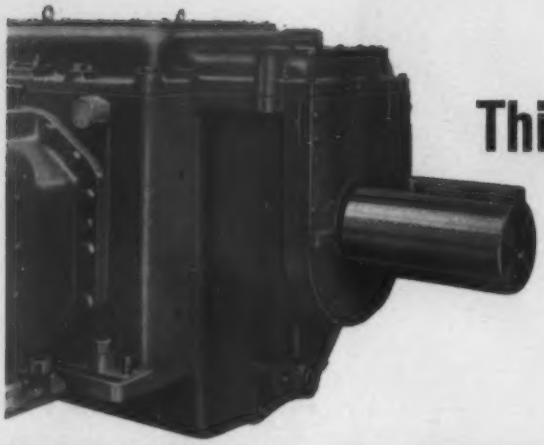
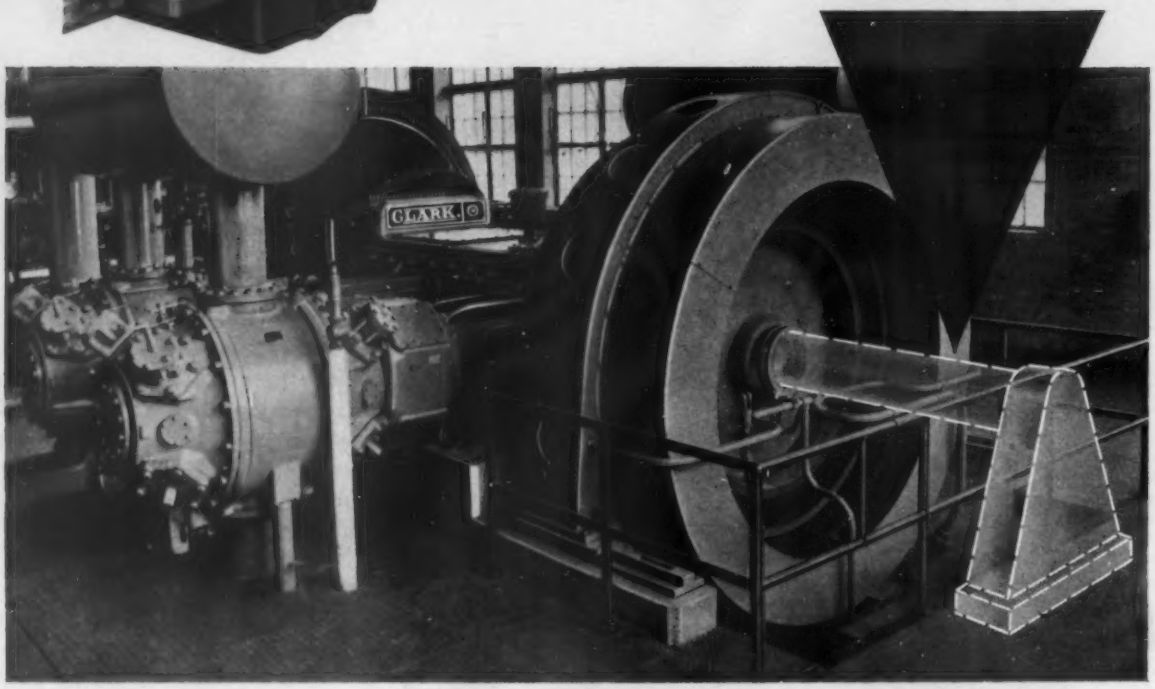


This Clark development eliminates outboard bearings



In 10 years, in hundreds of installations, NEVER a motor end-bearing failure!

Since Clark introduced *overhung rotor construction* in its Balanced/Opposed compressors a decade ago, hundreds of these air compressors have been built. Proof of the dependability of this design feature is the fact that not one motor end-bearing failure has occurred in over ten years.

Heavy duty crankcases and generously proportioned crankshafts and main bearings are the main reasons for this proved dependability. Here are additional advantages of Clark overhung rotor design:

EASIER INSTALLATION – Mounting the rotor directly on the crankshaft simplifies installation. Just align the stator to the rotor – that's all.

LESS MAINTENANCE – There is no outboard bearing to be knocked out of alignment. Motor bearing is integral with crankcase, lubrication is automatic. Self-centering of the rotor within the stator removes rotor weight from the bearing during operation.

SIMPLER DESIGN – One piece collector rings. Flywheel effect in most instances is completely built into the rotor thereby eliminating the flywheel.

LESS FLOOR SPACE – Close coupling reduces foundation requirements.

Overhung rotor construction is only one of many features found in Clark Balanced/Opposed Compressors. Review your requirements with your Clark representative for all the facts.

CLARK BROS. CO. OLEAN, NEW YORK

One of the Dresser Industries

ENGINES • COMPRESSORS • GAS TURBINES

CLARK

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BULLETINS

(Begins on page 23)

143 Safer Circuit Breaker—Bolted connections, coil protection and other advantages of Pushmatic circuit breakers are stressed in this 12-pp bulletin. Details of design and operation shown. Bulldog Electric Products Div., I-T-E Circuit Breaker Co.

144 Power Circuit Breakers—Illustrated 20-pp Bulletin GEA-6908 describes company's air blast power breakers for high-voltage circuit protection. Explains how full range of transmission voltages can be supplied from one basic interrupter module. General Electric Co.

145 Time Overcurrent Relay—Bulletin 5-050, 16 pp, describes time overcurrent relays designed to protect electrical equipment. Three different designs—inverse, very inverse, and extremely inverse—are featured, and complete technical data on operating characiteristics is given, including individual time-current curves. Federal Pacific Electric Co.

146 Reduced Voltage Starters—Eight-pp Bulletin GEA-6860 defines reduced voltage starters, tells when and where to use them, how to select them. Contains starter selection table and comparison table for determining which starter best suits the application. Illustrations show the manual autotransformer, magnetic autotransformer, primary resistor, and part winding starters, and schematic connection diagrams are included for each. Brief text stresses advantages of the line. General Electric Co.

147 Magnetic Starter—Illustrated and described in 16-pp Bulletin 14-B1 is a line of magnetic starters featuring simplicity of construction and maintenance. Cutaway views showing details are included, as well as application information, ratings, wiring diagrams, and selection data. Furnas Electric Co.

148 Small Basic Switches—Catalog 63 contains 20 pp of detailed information on a line of small basic switches for a variety of industrial applications. Describes features and applications, and includes photos, diagrams and specifications. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

149 Pre-Fab Distribution System—Safety and other advantages of company's Uni-Bus Masterguard electrical distribution system are detailed in this 28-pp bulletin. Describes features of various components in the prefabricated system, and includes rating tables, table for selection of ampere ratings, capacity data, dimensional data and specifications. Electric Distribution Products, Inc.

150 Underfloor Systems—Two underfloor wiring systems for use with cellular steel floor construction are described and illustrated in Form 692. Application data, catalog numbers and guide form specifications are included. National Electric Div., H. K. Porter Co., Inc.

151 Speaking of Wire, Cable—Presented in this 52-pp pocket-sized booklet is a glossary of wire and cable terms. Lists alphabetically common terms, expressions, and units used in the electrical wire and cable industry. Standard Wire & Cable Co.

152 Portable Test Sets—Featured in 8-pp Bulletin SB-OCR-1 are portable test sets for oil circuit reclosers. Operation details of the test sets are given, as well as specifications and overload capacity curves. Multi-Amp Electronic Corp.

153 Panel Instruments—Described in 24-pp Bulletin 3-15 is a full line of panel instruments, including a-c meters, d-c meters, elapsed time meters, and shunts and current transformers. Photos, dimension drawings, tables of ratings, and complete descriptive data are given, along with construction details and sectional views. Federal Pacific Electric Co.

154 Do-It-Yourself Transformer—Eight-pp Bulletin TP659 describes a do-it-yourself, self-contained toroidal primary coil complete with 5-way binding posts for connections. Includes wiring diagrams, typical calculation, and useful load voltages. The Superior Electric Co.

155 Equipment Control Connectors—Detailed information on equipment control connectors is presented in 12-pp Bulletin 372. Includes description of construction features, photos of products, dimensions, specifications examples of applications. Joy Mfg. Co.

CORROSION CONTROL

157 For Lining Tanks—This 6-pp bulletin describes Amer-Plate, a dense, flexible polyvinyl chloride sheet for lining plating, pickling and other tanks, vessels. Plain and T-ribbed styles are shown. Bulletin provides data on general, physical and chemical properties, chemical resistance. Lists solutions handled and shows how this industrial lining is applied to existing steel and concrete surfaces. Amercoat Corp.

158 Corrosion Control Tips—Control of water problems in air conditioning system—scale formation and slime and algae growths—is discussed in Bulletin 596. Offers suggestions for the control of these problems through adequate, planned chemical treatment. Application information as well as control testing data are included. Betz Laboratories, Inc.

VALVES, PIPING, FITTINGS

159 Hydraulic Valves—Operation and application of pressure controlled hydraulic valves are covered in 20-pp Catalog 230. Discusses factors influencing correct choice of valve, such as: normal spool position, operating pressure source, pilot or direct operation. Also shown are flow diagrams, pressure vs flow curves, ratings, dimensions, drawings and specifications. Rivett, Inc.

160 Iron Body Gate Valves—Service ratings, sizes, dimensions and material specifications are listed in this bulletin on iron body gate valves for construction, gas transmission, chemical, electric and petroleum fields. Cast iron wedge gate valves listed for steam, water, oil and gas. Walworth Co.

161 Precision Controls—Pressure regulators, strainers, flow control valves, sequence valves and quick exhaust valves are described and illustrated in Bulletin 91021. Specifications, outstanding features, ordering data and dimensions are also included. Airmatic Valve, Inc.

Postage-free Reader Service Cards make it easy to order bulletins. Two Cards are provided on the facing page.

162 High Vacuum Equipment—Valves, baffles and traps designed for high vacuum equipment are featured in 28-pp Bulletin 10-1. Features and methods of operation are detailed and photos, dimensional data and diagrams and other selection data are included. Rochester Div., Consolidated Electrodynamics Corp.

163 Plastic Pipe—Featured in 16-pp Bulletin CE-80 is Ace-Ite, general purpose rigid plastic pipe for processing industries, utilities, and general industrial use. Contains detailed technical data covering fittings and valves as well as pipe. American Hard Rubber Co., Div. Amerace Corp.

SAFETY, SANITATION

164 Industrial Gloves—Featured in 16-pp Catalog WR-459-28 is a line of industrial gloves and finger cots available in a variety of synthetic materials and natural rubber. Includes comparative test charts and detailed selection data. The Wilson Rubber Co., Div., Becton, Dickinson and Co.

165 Group Showers—This 8-pp bulletin describes multi-person type shower baths. Details of the basic shower column are given along with method of installation and floor plan suggestions. Photos show installations of shower columns alone and with stall-separating partitions. Also shown are wall-mounted multi-person showers. Bradley Washfountain Co.

HEAT EXCHANGERS AND BOILER AUXILIARIES

166 Heat Exchangers—Bulletin 113 describes five types of fired heat exchangers covering temperature ratings up to 1900 F, flow rates of air up to 550 lb/sec, and pressure ratings up to 5000 psig. Photographs of installations are included. Thermal Research & Engineering Corp.

BULLETINS

(Begins on page 23)

167 For Automatic Boilers—This 6-pp folder features a mechanical pressure atomizing oil and nozzle-mix gas burner for automatic boilers. Drawings illustrate construction features and operating principle. Boiler Engineering & Supply Co., Inc.

168 Standard Heat Exchangers—Design and application of company's standard heat exchangers is covered in 20-pp Bulletin B-20. Complete mechanical design data, and thermal rating tables, allow easy selection of these standard units for a range of services, including heating, cooling, condensing and vaporizing. Struthers Wells Corp.

169 Packaged Burner—Catalog 59-1 describes construction features and operation of a packaged burner integrated with an axial flow, hollow shaft forced draft fan. Photos, schematic diagram and general specifications. Faber Engineering Co., Inc.

RUBBER PARTS, PRODUCTS

170 Rubber Parts—Various types of molded and extruded rubber parts are illustrated and described in 6-pp Bulletin AD-167. Categorizes available rubbers in six groups, gives detailed description of each, as well as table of comparison data. The Garlock Packing Co.

171 Industrial Rubber Products—Primary physical properties of industrial rubber products and materials, including silicones, Buna-N, GR-S, synthetic, Neoprene and Teflon, are covered in this 16-pp bulletin. Also details comparative properties of natural and synthetic rubbers, and reaction of the materials to chemical components. Irving B. Moore Corp.

MECHANICAL POWER TRANSMISSION

172 Gear-Motors—Design and construction features of gear-motors from ¼ to 100 hp are described in Bulletin 51B9172. Included are integral and all-motor types, right angle and special designs. Allis-Chalmers Mfg. Co.

173 Mechanical Drive—Six-pp Bulletin 3600 describes the Allispede mechanical adjustable speed drive which operates on a-c power, offers speed ranges up to 8:1, ratings from 1 to 30 hp. Gives engineering and applications information. Illustrates modifications to the basic drive—remote controls, mounting flanges, etc. Graphs show speed regulation benefits gained by using a synchronous induction motor in the drive. The Louis Allis Co.

174 Industrial Drives—Detailed information on high speed standard industrial drives offering a maximum of selection flexibility is presented in 22-pp Bulletin 5904. Includes specifications, computing formulas, table of ratio factors, service factors, horsepower rating, outline dimensions, assembly details, lubrication schematics and photos of typical installations. Western Gear Corp.

175 Helical Speed Reducers—Two booklets, Bulletin J-18 and J-19, contain engineering data on shaft-mounted, in-line helical and right angle helical speed reducers. Each booklet contains 24 pp of rating tables, selection procedures and other technical data. Bulletin J-19 covers shaft-mounted reducers and J-18 deals with in-line and right-angle helical drives Hewitt-Robins Inc.

176 Spring Clutches—Described in this 30-pp catalog are five standard lines of spring clutches in bore sizes from ⅛ to 1 in., torque capacity to 1250 lb-in., for use in applications utilizing drive up to 5 hp. Clutches offered include over-running and back-stopping; indexing; on-off; on-off indexing; and safety lock control. Catalog lists specifications and provides technical and application data along with illustrations. Marquette Div., Curtiss-Wright Corp.

177 Electromagnetic Clutch—Detailed information on a complete line of electromagnetic clutches, in six series with torque capacities from 1.8 through 13,000 lb-ft, is furnished in 20-pp Bulletin 6304-1B. Provides design, specification and application data, photos, cross-section sketches, dimensions, torque ratings, speeds and prices. I-T-E Circuit Breaker Co.

178 More Flexible Couplings—An expanded line of Para-flex cushion couplings, from fractional to 190 hp per 100 rpm, is described in 12-pp Bulletin A669C. Of two new sizes included in the line is one capable of delivering 2000 hp at 1080 rpm. Photos, drawings and text explain design features and operating characteristics of Para-flex. Detailed tables of horsepower, ratings, prices, sizes provided. Dodge Mfg. Corp.

179 Fretting Corrosion Control—The several ways in which fretting corrosion in variable-speed sheaves can be controlled are discussed in Bulletin 7102. Details are clarified through the use of photos, sketches and diagrams. T. B. Wood's Sons Co.

RECORD SYSTEMS

180 Visible Control—How visible recordkeeping systems and housing equipment facilitate sound management decisions, and get work done faster by expediting machine operations is told in 12-pp Bulletin KD 854. Various types of housing unit, and four types of visible cross-reference equipment shown. Remington Rand, Div. Sperry Rand Corp.

181 Production Control System—Versatility of company's visible record systems in production control is illustrated and described in this 12-pp bulletin. How various types of visible record forms guide decisions—from sales records and market analysis, through engineering design, purchasing, cost, tool and die, shop parts and materials stores, production and scheduling—is pictorially presented. Acme Visible Record, Inc.

Among Recent Bulletins Of Special Interest

182 Fabrication of Plexiglas—This 34-pp "how to . . ." handbook outlines applications and characteristics of Plexiglas, covering design considerations, forming, cementing, machining, finishing, cleaning and maintenance, and annealing. Illustrated with cross-sectional drawings, the booklet also contains a reference guide to sources of supply for special fabricating equipment. Commercial Plastics & Supply Corp.

183 On Thermocouples—Catalog EN-S2 contains 50 pp of detailed information on thermocouples and thermocouple components and accessories. Lists and describes standard assemblies in protecting tubes and wells for general applications; specialized theromcouples and assemblies; and bare and insulated thermocouple wires, replacement elements, ceramic insulators, metal and ceramic protecting tubes, wells, terminal heads and extension leadwires. Leeds & Northrup Co.

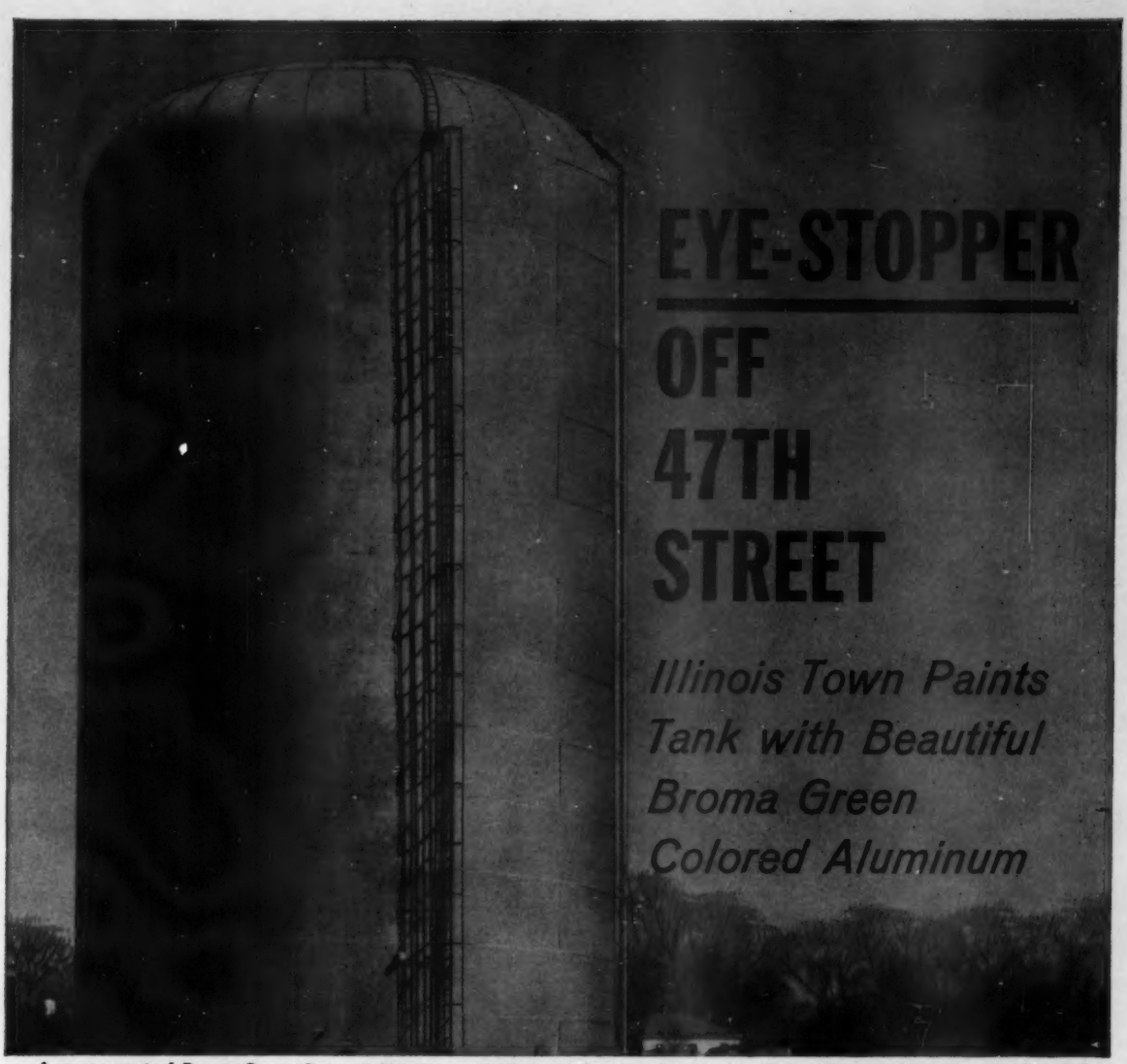
184 Refrigerated Purging Guide—Twelve-pp Bulletin 700 gives helpful data on the automatic removal of air from refrigeration systems. It answers such questions as why purging is necessary, how non-condensible gases affect efficiency, methods of purging, where to make purge connections and how to use the refrigerated purger. Armstrong Machine Works.

185 For Induction Heating—Recent developments in hardening, brazing, soldering, forging and annealing by Ther-Monic induction heating equipment are covered in 52-pp Catalog D2. As in previous editions of this catalog-handbook, there are many "how it's done" photos and machines are shown in operation. The case history technique has also been retained. Sections on electronic generator features, motor generator sets, low frequency heating units and other equipment have been expanded to include new developments. Induction Heating Corp.

COMPUTERS

186 Solid-State Computer—Advantages of company's solid-state computer which can be operated in small areas are detailed in this illustrated bulletin. Describes central processor, high-speed printer, read-punch unit and card reader. Remington Rand Univac, Div. Sperry Rand Corp.

187 Computer Platforms—Eight-pp Catalog VP-59 contains detailed information on an interlocking structural frame that facilitates the in-



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BULLETINS

(Begins on page 23)

stallation, hookup and air conditioning of computers. Structural details and installation procedure are illustrated. Macomber, Inc.

OTHER EQUIPMENT

188 **All-Weather Lubricant**—An all-weather, open-gear lubricant for outdoor equipment is featured in this 16-pp booklet. Listed are various grades and consistencies containing either colloidal graphite, colloidal molybdenum or non-graphited grades, and grade recommendations for outdoor equipment including bearings, cables and wire ropes, dipper sticks, gears. Acheson Coliods Co.

189 **Self-Lubricating Packings**—This 12-pp catalog tells what Palmetto self-lubricating packings are and discusses their advantages on pump rods and shafts and valve stems. Describes four stranded forms. Provides quick calculator tables on weights and lengths. Each of 29 packing types is illustrated and described as to recommended service, uses, temperature limits, sizes, packagings, prices. An applications chart pinpoints correct packing for each type of service. Greene, Tweed & Co.

190 **For Vapor Degreasing**—Booklet 44-A, 36 pp, deals with Nialk trichlorethylene, a chlorinated solvent for vapor degreasing, other uses. Describes operating procedures for degreasing equipment and advantages of this process. Lists basic cleaning cycles. A section on trouble shooting gives practical suggestions to cure operating difficulties. Also provided are details on unloading storage trichloroethylene, material and equipment specifications, safety measures. Tabulates physical properties of the solvent. Hooker Chemical Corp.

191 **Processing Equipment** — Contained in 22-pp Catalog 386 is detailed information on equipment for the processing of chemicals and food products, and for recovery of by-products. Mechanical details and specifications for a variety of evaporators, drum, rotary, spray and pan dryers, flakers and cooler, autoclaves, autoclave quick-opening doors, processing kettles, and gas cleaners are included. Buflovak Equipment Div., Blaw-Knox Co.

192 **Propeller Fans** — Self-cooled motor propeller fans designed to meet exacting application requirements are featured in 20-pp Catalog 159. Includes section on selection of proper fan to suit specific ventilation requirements and describes various types of fans for these applications, as well as giving complete specifications. Ilg Electric Ventilating Co.

193 **Mica Insulation** — Sixteen-pp Catalog 59 describes and illustrates Micabond bonded mica insulation, offering information on properties, tolerances and composition of various grades, including four new ones. Data on forms, sizes, weights are provided, and types of backings and bonding materials are treated. Fabricating aids, such as how to punch, turn, saw and drill the material, are also included. Continental-Diamond fibre Corp.

194 **Controlled-Air-Power** — Applications of air motor and other controlled-air-power work units are illustrated and described in 16-pp Bulletin ML-5. Advantages of the devices in a variety of applications are described. The Bellows Co.

195 **Tube Fittings**—Featured in 20-pp Form 259 is a complete line of tube fittings and accessories, including hydraulic tube fittings, straight thread fittings, flare tube fittings, and hydraulic accessories. Photos and specifications are included, as well as cutaways and drawings. Lenz Co.

196 **Electrical Resins**—Two methods of encapsuling re-wound electrical motors in epoxy resin are presented in step-by-step procedure in this brochure. Illustrates and describes the no-mold process and the molding process. Minnesota Mining and Mfg. Co.

197 **International Inch**—Eight-pp Circular 629 discusses the international inch recently adopted by the United States as the standard of measurement and how it will affect industrial operations. Includes chart for determining whether the difference between old and new inch will be significant for particular job of specific dimensions and tolerances, as well as conversion chart. Pratt & Whitney Co., Inc.

199 **Fluid Processes**—Sixteen-pp Bulletin 980 explains Fluidics—the science of fluid processes—and the materials and equipment for handling and processing liquids and gases used by industry. Covers corrosion engineering, water treatment, ion exchange, reactions, distillation and evaporation, drying and blending, centrifuging, heat transfer, filling, storage, agitation, valving and piping, gas analysis and control, flow rate metering and control, waste treatment, and project engineering. Pfaudler Permutit Inc.

201 **Economical Waste Disposal**—Drastic reduction of waste disposal costs is stressed in this 12-pp Brochure on the Somat waste disposal system. The Somat is designed to take in refuse, garbage and paper waste, chew it to a fine, odorless, compacted pulp, and discharge it to haul-away containers. Features and operation of the Somat are presented in detail. Wandel Machine Co.

202 **Fabrication Facilities**—Representative machine tools, plants and engineering and design operations of this manufacturer are described in this 32-pp facilities brochure. Emphasizes manufacturing facilities, including fabrication of steam condensers, steam jet vacuum equipment, centrifugal, axial and mixed flow pumps, nuclear components, and similar large machinery. C. H. Wheeler Mfg. Co.

203 **For Longer Tube Service**—Bulletin P-335 describes plastic tube protectors designed to extend the useable life of new and existing condenser and heat exchanger tubes. Protectors come in nylon, polyethylene and phenolic resin. Bulletin shows design features and method of installation. Includes sizes. Crane Packing Co.

204 **Dialing Long Distance?**—A chart showing direct distance dialing telephone codes and a map of standard time zones are offered by this company. Charts includes map outlining coded areas and general instructions for direct distance dialing. Ohio Seamless Tube Div., Copperweld Steel Co.

DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided on pages 287 and 288.

PUMPS, COMPRESSORS

301 **Non-Clog Pumps**—Bulletin P10-B41 describes a line of non-clog pumps for industrial processing, waste handling and sewage applications. Diagrams illustrating general arrangement are included, as well as tables of dimensional data, selection charts. Western Machinery Co.

302 **Centrifugal Pumps**—Features of company's centrifugal pumps of vertical split case design are detailed in 12-pp Bulletin IH-558A. Specifications, detailed selection tables and dimensional data and diagrams are included. Bell & Gossett Co.

303 **Rotary Pumps**—The positive displacement principle upon which these rotary pumps operate is illustrated and described in 34-pp Bulletin Section K. Discusses rotary pump fundamentals and includes detailed engineering data and selection tables. Viking Pump Co.

304 **Rotary Pumps**—Described in this bulletin are company's Series A internal gear rotary pumps for transferring a variety of liquid types in low medium viscosities. High- and low-speed models are available and pumps can be supplied in four constructions. Bulletin provides perform-

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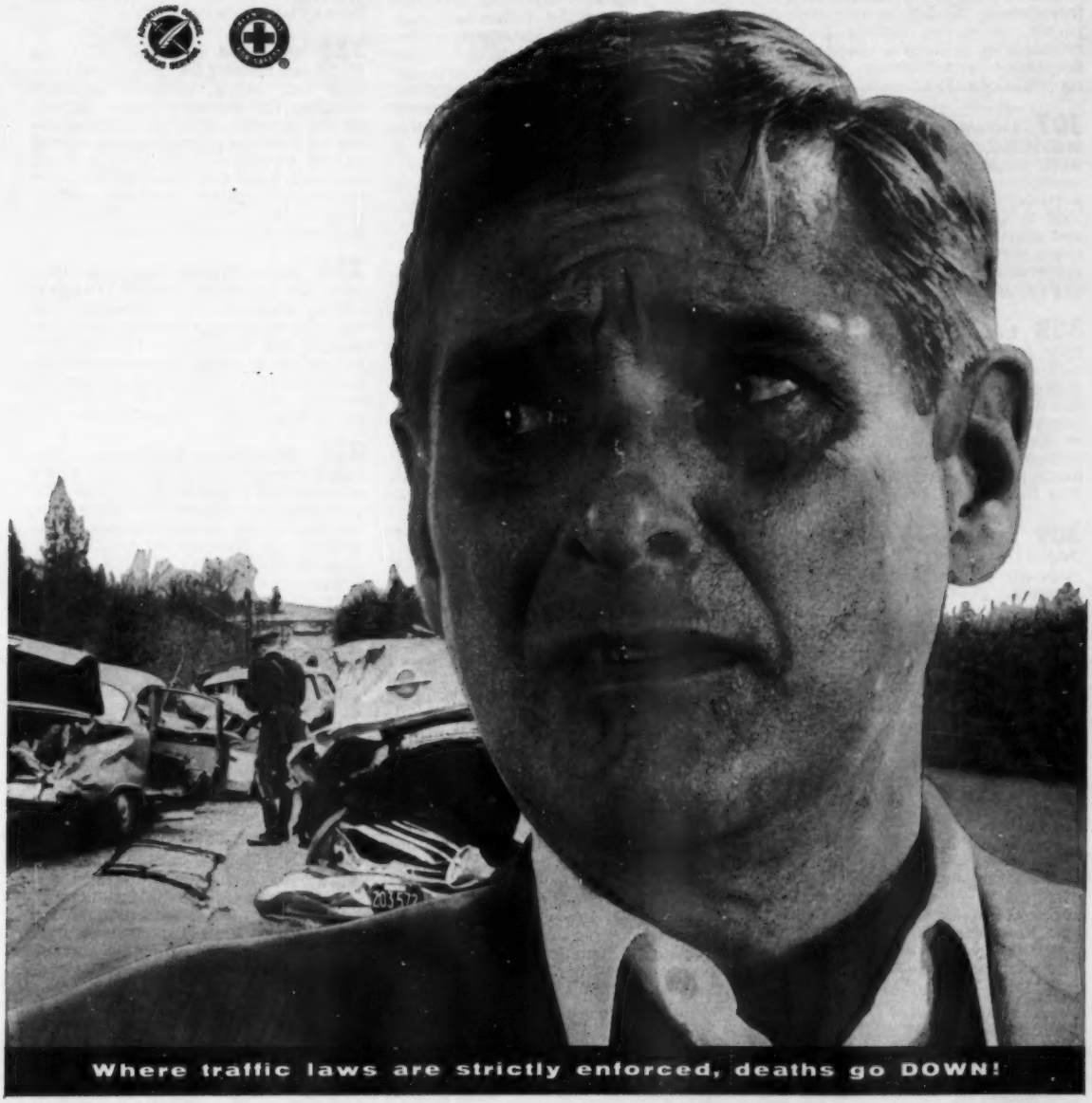

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DATA FILE

(Begins on page 292)

ance data and dimensions, drive assemblies. The Wayne Pump Co.

305 Pumps for Corrosives—Bulletin 725.2 contains 12-pp of data on a line of centrifugal pumps designed for handling corrosive liquids in the chemical process and allied industries. Sectional view showing internal parts is included, as well as specifications, performance curves and dimensional data. Goulds Pumps, Inc.

306 Continuous Flow Pump—Bulletin 30-C, 8-pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, specifications. Robbins & Myers, Inc.

307 Centrifugal Pumps—Two-stage centrifugal pumps designed for a wide range of heavy-duty pumping applications are illustrated and described in 16-pp Bulletin Form 7062-D. Details of impeller design and arrangement are illustrated with cross sectional views, and tables of performance characteristics are included. Ingersoll-Rand Co.

308 Let Air Do It—How "air may do the job" through use of air motors, compressors and vacuum pumps is told in 12-pp Booklet App-81. Written as an idea stimulator, it contains 43 photos and case histories of current original equipment applications. Diagrams illustrate pneumatic principles used to perform various functions. Gast Mfg. Corp.

309 Air Compressors—Bulletin CAS-17A describes a line of two-stage-air cooled, industrial air compressors. Features and advantages are listed, typical applications pictured, and specifications and other data included. Curtis Mfg. Co.

310 Oil-Free Compressors—Heavy-duty industrial oil-free compressors are featured in 12-pp Bulletin A-44. Component parts are illustrated and described, and internal construction is shown on cutaway. Joy Mfg. Co.

311 Heavy Duty Compressor—Eight-pp Bulletin 350 describes and illustrates a horizontal, water-cooled, single-stage, heavy duty compressor designed to fit most compressed air applications. Photos, line drawings and cross-sectional views illustrate construction details. Pennsylvania Pump & Compressor Co.

312 Water-Cooled Compressors—Featured in 12-pp Bulletin WB10 are two-stage water-cooled air compressors designed to meet the demand for small machines having efficiencies comparable to those of large two-stage horizontal compressors. Cutaway views showing component features are included, as well as general data tables. Gardner-Denver Co.

PACKINGS

313 Piston Packing—Sixteen-pp Bulletin 5503 presents engineering data on Darcova Pumcups for packing pistons of air cylinders, hydraulic cylinders and reciprocating pumps. Included are operating diagrams and a list of typical installations, as well as helpful data on Pumcup compositions. Darling Valve & Mfg. Co.

314 Teflon Products—Three bulletins present this company's Teflon packings, gaskets, special parts and stock. Bulletin CP552 describes Chempro lines of Teflon ring packing, Teflon impregnated asbestos packing, V-type packing and Teflon seal cage —for use with acids and strong chemicals. Bulletin CP553 covers Teflon jacket gaskets, solid ring gaskets, expansion joints and special gaskets. Bulletin CP554 illustrates special parts available. Chemical & Power Products, Inc.

315 Metal Packing—Featured in 24-pp Form AD-166 is detailed information on selection of metal packings for use wherever gas or air is compressed or expanded. Covers free-floating metal packings, metal rod packing rings, metal scraper rings, metallic or non-floating packings, rings. The Garlock Packing Co.

ELECTRICAL

316 Short, Drip-Proof Motor—Bulletin 2150 describes the drip-proof Pancake motor featuring substantial reduction in motor length. Presents engineering information on this flange type motor. A cutaway drawing shows how it achieves short length through formed end coils and one-piece housing-bearing bracket. The Louis Allis Co.

317 Rerated Integral HP Motors—Bulletin 520 describes polyphase open-protected motors in re-rated NEMA frames. Ratings through 200 hp. Motor Div., Robbins & Myers, Inc.

318 Motor Protectors—Questions and answers about company's built-in, three-phase motor protectors are designed to describe features and advantages of these control units. Typical applications are illustrated in Bulletin PR-1243. Metals & Controls Corp.

319 Hydraulic-Magnetic Breakers—Bulletin 301, 16-pp, describes advantages and operation of company's hydraulic-magnetic circuit breakers. Design and construction features are detailed and time-delay curves specifications and dimensional data included. Heinemann Electric Co.

320 Power Circuit Breakers—Individually enclosed low-voltage power circuit breakers are described in 8-pp Bulletin 4261-2B. Information includes design, installation and safety features, enclosure dimensions, ratings, application and selection charts. I-T-E Circuit Breaker Co.

321 Protective Relays—Featured in overcurrent relays, directional inverse time overcurrent relays, differential relays, instantaneous overcurrent relays (adjustable setting), inverse time voltage relays, auxiliary relays, ac-dc definite time relays, and reclosing relays. For each model, tabular data and photos cover its applications. Federal Pacific Electric Co.

322 Panelboards—Tumbler switch and plug fuse panelboards are featured in this product bulletin. Table of catalog numbers, ratings and sizes is included, as well as typical wiring diagrams, operating information, and specifications for the equipment. Frank Adam Electric Co.

323 Enclosed Switches—Catalog 83, 22-pp, Catalog 84, 16-pp, and Catalog 101, 24-pp, describe enclosed switches for industrial uses. Included are general switches designed for use on either a-c or d-c applications, sealed switches, heavy-duty limit switches, hand operated switches, and maintained-contact switches. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

324 Switch Wiring Diagrams—Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters are used. Allen-Bradley Co.

325 Distribution Equipment—Detailed information on company's line of electrical distribution equipment is presented in 82-pp '59 Marketeer, Catalog M-159. Among equipment described are Electrostrip multi-outlet assemblies, switches, lighting panelboards, power panelboards, switchgear assemblies, and various types of electrical duct. Tables of essential data. BullDog Electric Products Co., Div. I-T-E Circuit Breaker Co.

326 Electrical Equipment Digest—Electrical equipment illustrated and described in 160-pp Catalog Digest 142, includes load centers, circuit breakers, low voltage control, fusible service equipment and accessories, meter sockets and troughs, safety switches, panelboards, duct and fittings, starters. Square D Co.

327 Portable Distribution System—Described in this 30-pp Catalog PC-58 is a portable distribution system for electric lighting and power, including such applications as portable lighting, heating and ventilation equipment, welding machines, power tools, and lighting transformers. System diagrams showing how each unit fits are included. Whitney Blake Co.

328 Trolley Busway System—Three bulletins offer help on electrical installations involving cranes and

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5	2	1	2		3		ABOLITE										
4	3	2		1			APPLETON										
5	4	4		1			BENJAMIN	✓	✓	✓	✓	✓	✓	✓	✓	✓	
							CURTIS-ALLBRITE LTG.	✓	✓	✓	✓	✓		✓	✓	✓	
4	4						ELECTRO	✓	✓	✓	✓		✓	✓	✓	✓	
							SNDER-MONARCH	✓	✓		✓						
							GUTH	✓	✓	✓	✓	✓	✓	✓	✓	✓	
							KEYSTONE	✓	✓		✓	✓		✓	✓		
							LIGHTING DYNAMICS	✓	✓		✓	✓		✓	✓		
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6	4	6	3	2			QUADRANGLE										
							RUBY-PHILIPS	✓	✓	✓	✓	✓		✓			
							SMITHCRAFT	✓	✓	✓	✓	✓		✓	✓	✓	
5	3	3					SMOOT-HOLMAN	✓	✓	✓	✓	✓	✓	✓	✓	✓	
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							SUNBEAM	✓	✓	✓	✓	✓	✓	✓	✓	✓	
							SYLVANIA	✓			✓			✓	✓	✓	
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5	4	2		2			WESTINGHOUSE	✓	✓	✓	✓	✓		✓	✓	✓	
5	4	2					WHEELER-FULLERTON	✓	✓	✓	✓	✓	✓	✓	✓		
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DATA FILE

(Begins on page 292)

hoists, assembly and production lines, test lines and other moving electrical equipment. Bulletin 60, 40-pp, covers 60 amp systems; Bulletin 70, 32-pp, covers 225-500 amp systems; Bulletin 75, 44-pp, covers 100 amp systems. Each includes special section on installation planning and procedure, mounting. Feedrail Corp.

329 For High Voltage Cable—Test results and service records on an improved butyl rubber compound for high-voltage cables are announced in 12-pp Bulletin EB-27. Covers resistance to ozone, operating temperature, high-voltage, dielectric strength, aging, insulating resistance, absorption. Anaconda Wire & Cable Co.

330 Mineral Insulated Cable—Properties and applications of mineral insulated cable are described in this 12-pp bulletin. Method of fabrication is detailed, as well as installation procedure, construction and performance characteristics, and dimensional data is included. General Cable Corp.

331 Portable Electrical Cable—Detailed information on portable electrical cable for a variety of industrial applications is presented in this condensed catalog. Basic construction covered. Western Insulated Wire Co.

332 Wiring Devices—Catalog 60, about 80-pp, presents ordering data on wiring devices including a wide range of switches, convenience outlets, lampholders, fluorescent devices, cord connectors, adapters, wall plates, accessories etc. Fully illustrated with photos, catalog provides condensed information on features, dimensions, applications. Pass & Seymour, Inc.

333 Rigid Steel Conduit—Features and advantages of company's rigid steel conduits, electrical metallic tubing, and flexible metallic conduits are illustrated and described in 20-pp Catalog 603. Tables of dimensions and weights, and other data are included. National Electric Products Corp.

334 Rigid Steel Conduit—Bulletin RCP-940 contains 12-pp of detailed information on characteristics and advantages of rigid steel conduit designed for maximum safety of electrical distribution systems. Tables of dimensions and weights, and a rigid sizing chart. Rome Cable Corp.

335 Control Batteries—Bulletin CP-540 describes features and advantages of a line of batteries for control, switchgear and auxiliary power. Engineering details and specifications are tabulated. C & D Batteries, Inc.

336 Improved Battery Plate—Bulletin GB-1876 features information on silconic battery plate available on

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company's motive power batteries. Describes a process for introducing arsenic and silver cobalt sulphates into the active materials of positive plates which produces storage batteries having longer life, improved electrical characteristics. Gould-National Batteries, Inc.

LIGHTING, COMMUNICATION

337 **Architectural Floodlighting**—Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose models. General Electric Co.

338 **Lighting Standards**—The 1959 Edition of the RLM Standard Specification Book, a reference guide for industrial lighting units, has been strengthened in the areas of efficiency, design and construction quality. New specifications are also included covering two- and three-lamp special service fluorescent units, three types of units utilizing 800 ma fluorescent lamps, new incandescent reflector sizes, and mounting specifications. RLM Standards Institute.

339 **Incandescent Lighting**—The 24-pp "Incandescent Lighting Guide Book" features sections on the general advantages of incandescent lighting, the history of incandescent lamp developments, and includes chapter on basic types, bulb shapes, sizes, glass types and finishes, and bases. Sylvania Electric Products Inc.

340 **Lighting Maintenance Tips**—Principles and advantages of good lighting practice are presented in this 48-pp lighting maintenance manual. Much useful information has been added to this revised edition, including a guide to trouble shooting fluorescent installations, a section on planning group replacement of lamps, cleaning. Champion Lamp Works.

341 **For Hazardous Locations**—Explosion-proof and dust-ignition-proof mercury vapor lighting fixtures are described in Bulletin 2705. Lists explosion-proof fixtures with five styles of reflectors, all available with or without guard, two styles of dust-ignition-proof units. Crouse-Hinds Co.

342 **Signal Log**—Featured in this 44-pp "signal log" is a line of signal systems and devices, including fire alarms and warning systems, burglar alarms, thermostatic controls, intercoms, annunciators, buzzers, door openers, and clock and call combinations. Advantages for industry are detailed. Edwards Co., Inc.

343 **Communication System**—Featured in this bulletin is a transistorized communication system designed to provide communication between two or more persons or departments regardless of distance or surrounding noise conditions. Operating and equipment features are detailed. Gai-Tronics Corp.

TOOLS, WELDING, AND MACHINE SHOP

344 **Portable Electric Tools**—Form 10 features a complete line of portable electric tools including drills, screw-drivers, impact wrenches, magnetic drill presses, sanders, grinders, hammers, holesaws, and forged tools. The Black & Decker Mfg. Co.

345 **Electric Tools**—Catalog G-6 (1), 36-pp, describes electric tools for a variety of industrial applications, including drills, grinders, hammers, nut runners, polishers, right angle drives, sanders, saws, screw drivers and others. Application photos show features, prices included. Milwaukee Electric Tool Corp.

346 **Hydraulic Power Tools**—Bulletin A-5-58 covers independent pump hydraulic jacks, single and double plunger hand pumps and double acting air engine pumps. Advantages are detailed, typical applications discussed. H. K. Porter Co., Inc.

347 **Industrial Wrenches Hand Tools**—Tools for production lines, maintenance work and product servicing are presented in 156-pp Industrial Catalog 58-I. Loaded with pictures and tool facts, book describes in detail the complete line of over 4,000 tools—including chests and rollcabs. wrenches and sockets of all types, screwdrivers, pliers, pullers, etc. Snap-on Tools Corp.

348 **Powder Actuated System**—Two booklets cover applications of a powder actuated fastening system. One booklet shows how it can be used for plant maintenance—fastening conduits, bus ducts, junction and outlet boxes, surface raceways, fixtures and frames, etc. The second booklet indicates the correct fastening and charge to use. Ramset Div., Olin Mathieson Chemical Corp.

349 **Where to Use Your Stud Driver**—Twenty-pp pocket-size Form 955 describes and pictures applications of studs, using company's Model 450 stud driver. Provides some operating hints and safety precautions and covers use of studs through steel into concrete, wood into concrete, wood into steel and steel into steel, as well as their use in attaching pre-drilled fixtures. Remington Arms Co., Inc.

350 **Machine Mounts**—A vinyl cork, sisal machine pad and an adjustable machine mount for reduction of transmitted vibration and no bolting of machine are described in literature available from the company. Clark-Cutler-McDermott Co.

351 **Data for the Shop**—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44-pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. Coversion tables, steel numbering systems, machinability ratings. Standard Oil Co. (Ind.)

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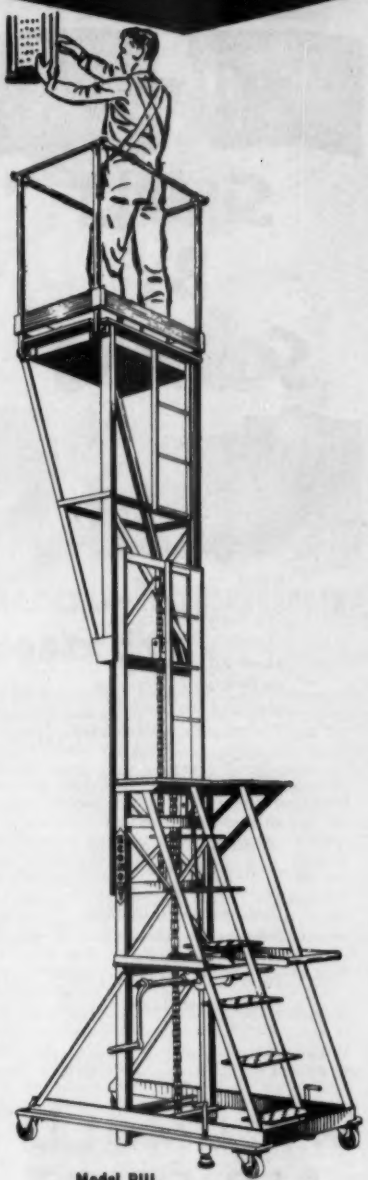

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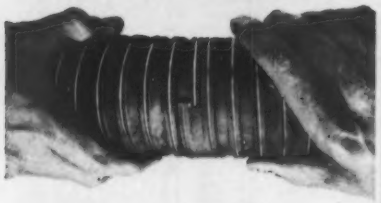

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DATA FILE

(Begins on page 292)

METALS

352 Molybdenum in Steel Castings—This 36-pp brochure on the role of molybdenum in steel castings for industrial equipment discusses hardenability, tensile properties, fatigue, hardness, wear and impact resistance, machinability, and weldability of cast steels. Climax Molybdenum Co.

353 Aluminum and Steel Data—Comprehensive selection data on aluminum and steel available in stock for almost every application is presented in this 242-pp buying guide. Necessary weights, dimensions and descriptive data are tabulated. Individual sections cover structural shapes, construction products, plates, sheets, hot rolled bars, cold finish bars, alloy and tool steel, tubing, stainless steel, aluminum, others. Joseph T. Ryerson & Son Inc.

MECHANICAL POWER TRANSMISSION

354 Fluid Drive—Eight-pp Bulletin 9819 describes and illustrates adjustable speed Gyrol fluid drives, 1- through 25-hp, giving advantages and applications. Components and operation are also covered in detail. Industrial Div., American-Standard.

355 Flange Mounted Drives—Bulletin 7140 contains selection data for flange mounted drives for a variety of applications. A load classification table is included, as well as tables of minimum sheave pitch diameters, load location factors, overhung load capacities. The Falk Corp.

356 Screw Conveyor Drive—Featured in 16-pp Bulletin A667C is a screw conveyor drive complete with speed reducer, packing gland and drive shaft, all of which mount as a unit on a trough end. Includes photos, engineering drawings with dimensions, prices, and tables to facilitate selection of units and V-belt drives as required. Dodge Mfg. Corp.

357 Packaged Speed Control—Bulletin 20,000, 8-pp, describes a line of packaged speed control drives which incorporate power conversion equipment for converting a-c to d-c power. Advantages are detailed and component features described. The Clark Controller Co.

358 Transmission Belting — Application information on company's line of transmission belting is presented in 16-pp Bulletin S-5174. Specific types of belting for a variety of applications is illustrated and described, and technical data tables, and a selection table for drives included. The Goodyear Tire & Rubber Co.

359 Anti-Friction Bearings — Catalog 424-B entitled "The broadest line

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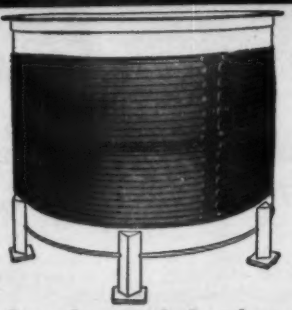

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in the anti-friction field," is an 8-pp folder giving capsule presentation of company's entire product line. A brief description of each product is provided. SKF Industries, Inc.

360 Flexible Couplings—Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings. Thomas Flexible Couplings Co.

361 Coupling Data—An integrated selection of product bulletins and data on company's line of couplings for a variety of industrial applications is presented in this handy ring-bound notebook. The notebook contains sections on product literature, engineering data, instruction sheets, application data, and price lists. To all of these sections, additional material can be added as it becomes available. Koppers Co., Inc.

VALVES, PIPING, FITTINGS

362 Stainless Steel Valves—Corrosion resistant stainless steel valves are featured in 32-pp Catalog 59SS. Features of design and construction are shown through cutaway views, and advantages of stainless steel in withstanding corrosive attack of chemicals and atmospheres are detailed. Jenkins Bros.

363 Corrosion-Resistant Valves—Featured in 24-pp Catalog 425 are stock, wedge gate, check, throttle and digester cap valves made of corrosion-resistant materials. Includes tables giving critical dimensions and material specifications. W. G. Rovang and Associates, Inc.

364 Industrial Valves—Bulletin 507X illustrates and describes company's line of industrial valves for control of air, gas, liquids and solids. Features photos and descriptive detail on a variety of valves, including butterfly valves, water valves, slide valves. W. S. Rockwell Co.

365 Plug Valves—Catalog PV-5 contains 38-pp of detailed information on company's lubricated plug valves designed for positive shut-off of fluids. Design and construction features are fully illustrated and described, and cutaway views of various models in the line are included. The Wm. Powell Co.

366 Pressure-Reducing Valve—Bulletin J-160 describes features and advantages of company's pressure reducing valves for dead end shut-off and positive pressure regulation. Operation details are shown on cutaway view, and recommended capacities given on tables. OPW-Jordan.

367 Manual on Traps—This 40-pp engineering manual is designed to assist in the sizing, specifying and selection of steam traps and other fluid specialties. Includes steam trap selection guide, explanation of four basic types of traps and how they perform their function, four steps to follow in sizing a steam trap, table of factors and detailed instructions on how to select steam traps for over 45 major classes of equipment. The V. D. Anderson Co.

368 Impulse Steam Traps—Bulletin T1744 describes a line of impulse steam traps designed for light condensate load requirements. Operation is detailed, and capacities, dimensions tabulated. Yarnall-Waring Co.

369 On Steam Traps—Catalog K is an enlarged 48-pp manual and steam trap catalog. New material provided includes open float and thermostatic traps, pipe strainer to 6 in. in steel and semi-steel, and helpful steam pipe sizing tables. Discusses fundamentals of good trapping, trap selection, installation, testing, repairs. Armstrong Machine Works.

370 Process Piping—Chemical-resistant plastic pipe, fittings and valves are featured in 16-pp Bulletin CE-80. Advantages are detailed, and installation procedures outlined. Technical data tables are also included. American Hard Rubber Co.

371 Reinforced Plastic Pipe—Detailed information on characteristics and applications of reinforced plastic pipe is presented in this 16-pp bulletin. Temperature and pressure curves are included, along with dimensional data and diagrams. Amercoat Corp.

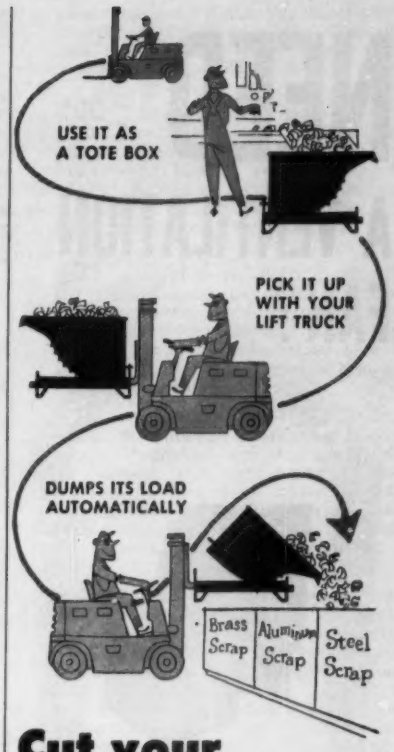
372 Guide to Couplings—This 26-pp general catalog describes company's quick-connect, quick-disconnect couplings, including a coupling for high pressure applications, for impact in air lines, for low pressure applications, for vacuum and very low pressures, etc. Snap-Tite, Inc.

373 Fluid Line Coupling—Catalog 100 contains data sheets describing company's line of quick-connective fluid-line couplings for pneumatic, hydraulic, oxygen, acetylene, steam, various gases and liquids service. Photos and dimensional diagrams are included. The Hansen Mfg. Co.

374 Forged Steel Unions—Eight-pp Bulletin U-2-58 provides detailed specification data on all types, sizes, of forged steel unions, materials and pressure ratings. Design and application advantages are discussed and illustrated. Forge and Fittings Div., H. K. Porter Co., Inc.

375 Self-Cleaning Strainer—Bulletin 1210B describes self-cleaning, semi-steel pipeline strainers in sizes from ¼ through 3 in., featuring high strength construction of the bodies, long tapered screen socket, perforated heavy-gage screen. Includes dimensions, weights. Sarco Co., Inc.

376 Bellows Design Guide—Twenty-pp Catalog 155 contains helpful information on applications, design considerations, and standards for me-



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DATA FILE

(Begins on page 292)

tallic bellows. Details on using bellows manufactured from various metals are included. Flexonic Corp.

FILTRATION

377 Filters, Strainers—Industrial Catalog 1058, 48-pp, provides application and engineering information on company's line of micro-filters and precision strainers. Fuel filters, full flow and by-pass lube filters, dry type air filter, air separators, and metal edge strainers shown. Purolator Products, Inc.

378 Filters for Industry—Illustrated and described in this product bulletin are filters for a variety of applications in industry. Among those covered are liquid filters, intake filters, pipe line filters, dry and viscous panel filters, precipitators, Electro-Staynew mist collector, and a dual action filter. The Dollinger Corp.

DUST, FUME CONTROL

379 Dust Control Systems—Bulletin 104, 36-pp, on company's dust filters, gives detailed information about dust control systems and how to engineer them. Includes description of the Roll-Clean Dynaclone dust filter, as well as information, capacities and dimensions for other dust filters. The W. W. Sly Mfg. Co.

380 Dust Collectors—Cabinet cloth filter dust collectors are featured in this series of information bulletins. Photos illustrate internal design and typical applications of the compact, efficient collectors. Multiple rating tables, specifications and dimensional drawings included. Torit Mfg. Co.

381 Dust and Mist Collectors—Illustrated and described in this fold-out, chart-size bulletin is company's line of dust and mist collectors and accessory equipment. Detailed specifications are included, as well as photos of typical applications. Aget Mfg. Co.

382 Dust, Fume Control—A wide range of industrial dust and fume producing processes that can be successfully controlled with the properly designed cloth or glass bag-type dust collectors is covered in 24-pp Bulletin 562-D. Operating principles are illustrated. Wheelbrator Corp.

383 Dust, Fume Control—Sixty plant installations are illustrated and described in this 52-pp catalog on dust and fume controls systems. Sections are devoted to systems for the ceramic, foundry, grain, metalworking, steel and woodworking industries, and many types of dust and fume control are featured, including centrifugal collectors, unit collectors. The Kirk & Blum Mfg. Co.

384 Industrial Dust Control—A wide variety of collection methods for industrial dust control is described in 16-pp Bulletin 922. A typical case history is included as well as photos, cutaway views, drawings and capacity data. Pangborn Corp.

FANS, VENTILATING, AND AIR CONDITIONING

385 Induced Draft Fans—Catalog L-3 describes induced draft fans designed for any induced draft application for temperatures up to 800 F. Gives dimensions, capacities, as well as installation data. Fuller Co.

386 Mechanical Draft Fans—Eight-pp Catalog 1361 describes centrifugal fans designed for handling abrasive gases at elevated temperatures. Complete application, performance and physical data are given, as well as a list of optional accessories. Sturtevant Div., Westinghouse Electric Corp.

387 Air-Moving Equipment—Bulletin DB 45-58, 20-pp, contains detailed information on company's line of roof ventilators, bifurcators, axial flow vent sets, and air jets. Bonded performance ratings are listed on tables, and dimensional data included. De-Bothezat Fans Div., American Machine and Metals, Inc.

388 Ready Units—Catalog 515 provides 28-pp on complete, ready-to-run centrifugal fan equipment. Capacities 400 to 13,000 cfm, v-belt and direct driven units. Dimensions and capacities included. Clarage Fan Co.

389 Air Diffusers—Bulletin 30F present information on company's air diffusers, high velocity valve attenuators, and air recovery equipment. Units are described and illustrated as to design requirements, dimensions. Connor Engineering Corp.

390 Industrial Fans—Bulletin I-585 contains 16-pp of detailed information on industrial fans for use as blowers and exhausters. Includes temperature and altitude selection data, capacity tables, dimensional diagrams of arrangements, and other information. The Day Co.

391 Industrial Diffusers—Described in 8-pp Catalog F-7722 is a line of industrial diffusers designed for applications where full range air pattern adjustment is essential to human comfort. Complete dimensional data, diagrams and specifications are included. Barber-Colman Co.

392 Power Exhausters—Bulletin 58-B contains 12-pp of detailed information on company's line of power exhausters. Construction features are illustrated and described, and performance and dimensional tables are included. Cutaway views and drawings show internal construction features. Jenn-Air Products Co., Inc.

393 Flexible Air Duct—Described in this product Bulletin 591 are a

variety of applications for flexible air duct, ranging from cooling ducts on electronic instruments to exhaust ducts on machine tools. The Wiremold Co.

394 **Zone Control Cabinets**—Air conditioning zone control cabinets are described and illustrated in 20-pp Bulletin AC-220. Separate sections with tables, curves and sketches cover proper unit selection, physical data, dimensions, fan performance and coil ratings for water cooling, direct expansion, hot water and steam. Buffalo Forge Co.

395 **Air Conditioning Systems**—Summer and winter air conditioning systems for year-round comfort are illustrated and described in 24-pp Form L-115. Covers waterless conunits, water-cooled packaged air conditioners, gas and oil winter air conditioners, and individual room conditioners and other equipment. Capacity data, dimensions and specifications. Airtemp Div., Chrysler Corp.

PROCESSING EQUIPMENT

396 **Fluid Mixers**—Advantages and mechanical features of company's industrial mixers designed for a variety of fluid mixing operations are detailed in a series of bulletins available in this ring-bound notebook, containing Bulletins B-102, 103, 104, 108 and 111. Selection tables, outline dimensions and photos of typical applications are included, as well as specifications, mixed capacity tables, photos. Mixing Equipment Co., Inc.

397 **Classifying Systems**—This bulletin covers major advantages, industrial applications and design features of high efficiency classifying systems for efficient separation or dedusting of dry powdered materials. Includes details on operation, flexibility of arrangement, power requirements, construction. Buell Engineering Co., Inc.

You'll save time in ordering bulletins by using the Reader Service Cards on page 288. Of course we honor letterhead requests—but it takes us somewhat longer to handle them.

398 **Corrosion Resistant Products**—Featured in this 8-pp bulletin are resin bonded fiber glass products for the chemical industry, including ducts, stacks, hoods, fans, tanks, trays, ejectors, hoppers and covers. Typical applications are illustrated and specifications and dimensional data included. du Verre Inc.

HEATERS, HEATING

399 **Heating, Ventilating Units**—Advantages of design and performance of these heating and ventilating units are described in 36-pp Catalog 858. Detailed selection data and performance tables are included, as well as arrangement diagrams, dimensions, control suggestions, piping diagrams and suggestions, specifications and weights. Modine Mfg. Co.

400 **Direct Fired Heaters**—Complete description and specifications on unit heaters, duct furnaces and heavy duty heaters are presented in 12-pp Bulletin A1-1.2b. Cutaway views and construction features are included. Reznor Mfg. Co.

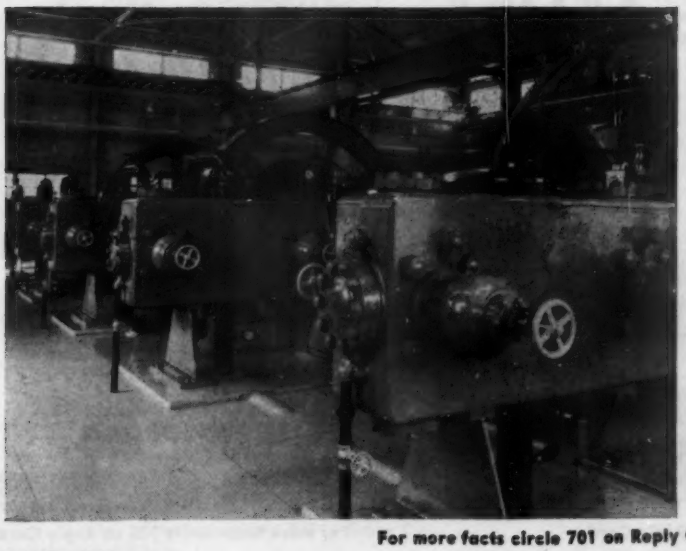
401 **Unit Heaters**—Eight-pp Bulletin UH858 contains detailed information on company's line of gas-fired unit heaters for a variety of applications. Design and installation data is given, as well as performance results, dimensions. Grinnell Co., Inc.

402 **Heating and Ventilating**—Company's "comfort curtain" principle of heating and ventilating is described in this 8-pp bulletin. Advantages are detailed an dtypical installations pictured through drawings and photos. Lennox Industries Inc.

403 **Electric Process Heaters**—Catalog 60, 64-pp, illustrates complete line of Chromalox electric process heaters and discusses their many uses. Presents some 15,000 types of heaters to fit most applications. Includes a comprehensive application section and a technical section to aid in accurate calculation of heating requirements. Each product is illustrated and described with lists of types, sizes and ratings. Edwin L. Wiegand Co.

Quick Case History—reading time 39 seconds

How Hagan CS Inhibitor keeps compressors corrosion-free at UNITED FUEL GAS COMPANY



THE PLANT: Major gas company uses 1000-hp compressors to maintain high gas pressure for transmission. Eight compressor stations are involved throughout West Virginia.

THE PROBLEM: Compressor cooling water is in closed system utilizing fin fans for temperature drop. Pipes became severely corroded due to oxygen attack. At one compressor station, for example, this corrosion caused failure of 2" black iron piping on discharge side of horizontal compressors.

THE SOLUTION: Hagan CS Inhibitor is now being used in a number of compressor cooling systems. Since introduction of CS Inhibitor, no maintenance or replacement of treated system has been necessary except to repair damage which accrued before treatment was started. Cooling systems have no present problem with corrosion.

TEST RESULTS: Recent 90-day test run on 2 cycle vertical compressor engines showed a corrosion rate (mg/dm²/day) of 0.02 for steel, 0.01 for copper. Other tests taken at the other installations have shown similar results.

GET FULL INFORMATION on how your equipment can give longer life with less maintenance and more effective operation by using Hagan CS Corrosion Inhibitor in its closed water system. Write for Bulletin No. 410-12-3.

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In Canada: Hagan Corporation (Canada) Limited, Toronto

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DATA FILE

(Begins on page 292)

404 **Thermo-Panel Coil**—Technical Data Bulletin 355 is a 48-pp guide to company's panel coil for heating and cooling applications. Features of materials and design are illustrated and described, and detailed specification and dimension tables, heat transfer coefficient charts, capacity tables, other data are included. Dean Thermo-Panel Coil Div.

MAINTENANCE

406 **Basic-Roofing Information**—"What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses roofing practices. Johns-Manville.

407 **Aluminum Roof Coatings**—Advantages of aluminum asphalt roof coatings are detailed in 12-pp Form AD 454. Full application information includes recommendations for use, how much is required, and surface preparation. Aluminum Co. of America.

408 **Handbook on Coatings**—This is a 32-pp treatise highlighting the stopping and preventing of rust on nearly all types of rustable metal. Book contains information and recommendations to enable determination of specific coatings needed. Basic principle of Rust-Oleum's fish oil penetration into metal is shown. Rust-Oleum Corp.

409 **Color Conditioning**—How to put the power of color to work profitably is explained in this 28-pp color conditioning booklet. Tells how color conditioning boosts production, improves morale and promotes safety, and includes some full-color photos to illustrate "before-and-after" situations in typical plants. E. I. du Pont de Nemours & Co., Inc.

410 **Guide to Maintenance Products**—Catalog 56, 48-pp, on industrial maintenance paint products lists specialized coatings to resist alkalies, acids, oils, grease, moisture. Book also covers waterproofing, roof coatings, caulking compounds, floor patching materials. Gives technical information on paints for special applications. Steelcote Mfg. Co.

411 **Zinc Coating**—This bulletin describes a special zinc coating applied as a paint to provide galvanic protection to metals. A variety of applications are detailed. Subox, Inc.

412 **Protective Coatings**—Described in 8-pp Form PC 50 are industrial protective coatings for a variety of specific applications. Characteristics of a coal tar-epoxy resin coating, Gilsonite-asphalt matics, and cold applied coal tar coatings and application methods are fully described and advantages detailed. Pittsburgh Coke & Chemical Co.

413 **Aluminum Paint**—Benefits provided by aluminum paints for interior and exterior use are detailed in this product bulletin. Typical applications are illustrated and described. Reynolds Metals Co.

414 **Vacuum Units**—This bulletin describes heavy-duty, portable vacuum units designed for a variety of plant housekeeping jobs. Application in removing litter, conveying or reclaiming materials, and collecting hazardous matter is covered. Invincible Vacuum Cleaner Mfg. Co.

415 **Industrial Vacuum Cleaning**—Twelve-pp Bulletin 155 B describes both stationary vacuum cleaning equipment and portable industrial vacuum cleaners, the latter in both light and heavy-duty types. Recent improvements in collection are covered. Spencer Turbine Co.

416 **Industrial Steam Cleaners**—Advantages of cleaning with steam are illustrated and described in this 6-pp bulletin. Applications for heavy-duty production cleaning, paint-stripping, phosphatizing are detailed and complete specifications on the portable units given. Turbo Machine Co.

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EASTON CAR & CONSTRUCTION COMPANY
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▲ 100-ton walking-action trailer

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CUSTOM BUILT

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A-1065

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CAM TIGHTENS
NEVER FAILS
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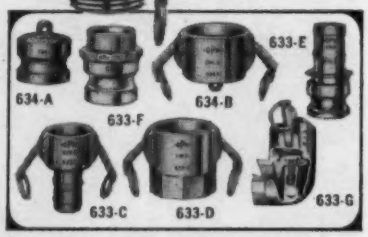

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All styles of adaptors fit in all styles of couplers of the same size.

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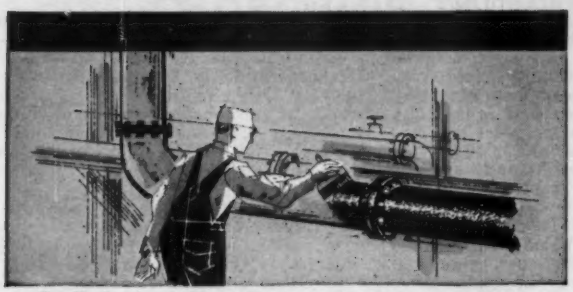
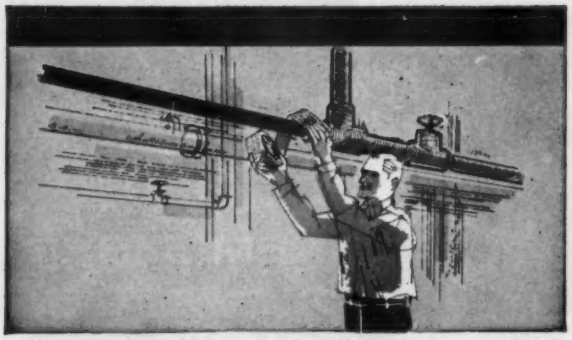
Industrial plants know Mortell products offer more positive protection than any other drip-and-rust preventive. Maintenance men know that paints or compounds of paint and fish oil provide little or no permanent protection. Rust-inhibiting NoDrip Plastic Coating is a moisture-proof insulation that *does* stop condensation . . . forms a seamless jacket . . . *does* stop corrosion. NoDrip Tape, with its triple insulating barrier, is equally dependable.



For Tanks, Large Pipes, Air Ducts, Metal Equipment, Walls, Ceilings, Permanently End Condensation Drip, Rust and Corrosion With NoDRIP PLASTIC COATING

The heavy consistency of NoDrip outlasts many coats of paint or ordinary rust-preventives. Permanently insulates and protects. Applies easily with trowel, brush or special spray. Non-toxic, odorless and non-flammable. Resists acid, alkali, brine solutions or vapors. Available in 1, 5 and 55 gallon drums.



For Smaller Pipes or Tubing, Permanently End Condensation Drip, Rust and Corrosion With NoDRIP TAPE

An easy-to-use, wrap-around pipe covering, perfectly pliable, cork-filled, completely self-adhering. Forms an air-tight, 100% vapor- and moisture-proof jacket. Fits snugly even around tees, unions, angles, valves. Cuts maintenance costs—makes out-of-the-way storage areas useable—ends slip and slide floor hazards. No need for vapor seals, brads, fasteners or tools of any kind.

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Coburn Overhead Conveying Equipment

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DATA FILE

(Begins on page 292)

417 Engineered Maintenance—This 16-pp booklet tells how to control costs improve efficiency and save management time in sanitary maintenance. Tells what an engineered maintenance program includes, how it is prepared, advantages afforded. Puritan Chemical Co.

SLINGS, CHAINS, WIRE ROPE AND FITTINGS

418 Slings For Industry—Bulletins 5886 and 5308-R describe Safe-Guard cable-laid slings, designed for applications where a soft sling body is required and where flexibility is more important than resistance to abrasion; and rope-laid slings for applications where abrasion resistance is a must. Macwhyte Wire Rope Co.

419 Sling Chains—Seven points to consider when buying sling chains are outlined in this product Bulletin DH-101. A working load limit table is included. American Chain Div., American Chain & Cable Co., Inc.

420 Wire Rope Selection Tips—This 16-pp illustrated booklet, "How To Be A Wire Rope Expert," describes basic principles governing selection of proper rope construction. Describes five factors to be considered and shows how these can be balanced for best possible efficiency regardless of application. Also illustrated is a device called the D/d ratio for determining best relationship of rope size to sheave or drum size. Leschen Wire Rope Div., H .K. Porter Co., Inc.

421 Drop Forged Fittings—Comprehensive data on company's line of drop forged fittings for wire rope and chain are presented in 40-pp Catalog 950-2. Includes specifications, dimensions, rated capacities and weights. Crosby-Laughlin Div., American Hoist and Derrick Co.

MATERIALS HANDLING

422 For Overhead Handling—Booklet 2008-N 12-pp, is replete with illustrative material on principal components of overhead handling systems. Track design and advantages of supporting it flexibly are described, and formulas and figures for comparing various track systems given. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

423 Industrial Cranes—Described in Bulletin GL-758 are industrial cranes for a variety of applications, including heavy duty cranes, full gantry, top-running double girder, motor driven cranes with outriggers, semi-gantrys, hand-geared cranes, push-types cranes, underhung motor driven multiple runway cranes, and others. Borg-Warner Corp.

424 Material Handling System—How production, storage and material movement can be simplified, speeded-up and integrated with the use of Work-O-Matic units is detailed in 10-pp Catalog 89. Photos illustrate use. The Union Metal Mfg. Co.

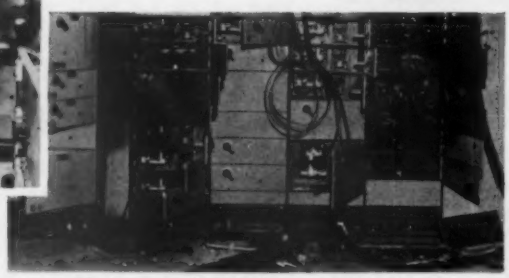
425 Automatic Bulk Handling—Bulletin 531, 12-pp, on new techniques for automatic bulk, handling describes pneumatic conveying methods in integrated manufacture. Describes two polyethylene handling installations to show how a system approach to air conveying solves complex handling problems. Dracco Div., Fuller Co.

426 Electric Hoists—Twelve-pp Bulletin DH 133D describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conducting systems. Clearance data included. Wright Hoist Div., American Chain & Cable Co., Inc.

427 Sheet and Coil-Lifters—Bulletin SL-30, 16-pp, illustrates and describes various types of standard and semi-special lifters for one-man or automatic handling of sheet and coil stock. Advantages and design features are detailed and tables listing dimensions included. Cullen-Friestedt Co.

428 Vibrating Screens—Featured in 50-pp Book 2777 is a line of vi-

Switchgear accidents can be prevented



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. . . through an adequate preventive maintenance program with

New CIRCUIT BREAKER TESTERS

. . . *designed for field testing all current actuated protective devices*

New MULTI-AMP portable test sets have been especially developed for simulating high fault currents and determining tripping characteristics of circuit breakers and other tripping mechanisms. Circuitry provides a continuously adjustable low voltage, high current source for safe and accurate testing. Test unit may be overloaded up to 500% of rating. Instrumentation includes current actuated timer to indicate current flow regardless of output terminal used . . . provides means of measuring elapsed time of test from 0.01 seconds or 0.25 of a cycle to 60 seconds; also measures in minutes and totalizes to 60 minutes. 4½-inch ammeter is accurate to ±2% with pointer preset mechanism. Standard test sets rated 1 Kva to 75 Kva provide simulated fault currents from 50 to 50,000 amperes. Other units can be especially designed to meet your test specifications.

MULTI-AMP Division *Send* for Bulletin SB-CB-1

MULTI-AMP ELECTRONIC CORPORATION

485 LEHIGH AVENUE UNION, NEW JERSEY

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PALMETTO Packings pack more performance into every application

GET THEM at any industrial distributor authorized to carry Palmetto Packings . . . For the name of a supply house near you consult our insert in Thomas Register—between pages 4816-4817.

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guaranteed rated capacities

- Stronger hooks... stronger eyes ...stronger jaws
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Write for free specifications catalog listing the most complete line of drop forged fittings for wire rope and chain.

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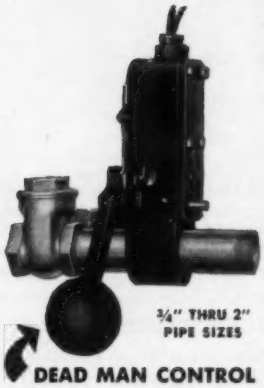
Bowser remote control valves for hazardous liquids

Do these things



¾" THRU 2" PIPE SIZES

DEAD MAN CONTROL

1. Simultaneously control flow of liquid in pipe and start or stop pump.
2. Operate one or more discharge lines from single remote power pump.
3. Provide safety factor required for insurance approval.

Bowser Figure 221 Remote Control Valve consists of a quick-acting bronze gate valve and explosion-proof mercury switch integrated for easy, in-line mounting on any pipe line. Valve and switch are actuated by weighted handle. When handle is released, flow and pump stop simultaneously.

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For outdoors against weather or indoors against vapor or moisture, use these specially designed thermal insulation coating products.

- Flintkote C-13-A—an asphalt base clay emulsion for a breathing type of coating.
- Thermalkote*—weather resistant asphalt mastic for heavy duty over wire-held insulation.
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For full particulars including light reflective finishes for asphalt coatings write: The Flintkote Company, Industrial Division, 30 Rockefeller Plaza, New York 20, New York.

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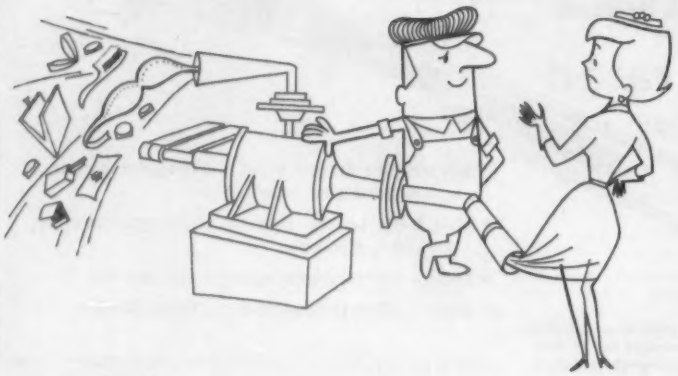
WEMCO® the INCREDIBLE Torque-Flow Pump

pumps almost everything
(what will go in will come out)



secret: recessed impeller; continuous open passage
(completely non-clogging)

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DATA FILE

(Begins on page 292)

brating screens designed to process a wide range of materials. Screens for a variety of applications are illustrated and described, including liquid vibrating screens, screens for scalping operations, for dewatering, washing and sizing, foundry shakeouts, pulsating magnet screens, and others. Comprehensive selection and dimensional data is included. Link-Belt Co.

429 **Vibrating Feeders, Conveyors**—Catalog 930 is a 96-pp book which extensively outlines company's line of electrical vibrating equipment. Covers hourly capacities, electric controls, dryers and coolers, bin level indicators and barrel packers. Principles of operation and detailed specifications are amplified by numerous photos. The Jeffery Mfg. Co.

430 **Vibratory Equipment**—Featured in this 40-pp brochure is a line of vibrating equipment, including feeders and unit vibrators. Design and construction features are illustrated and described and advantages detailed. Dimensional drawings and diagrams are included, as well as specifications. Eriez Mfg. Co.

431 **Self-Dumping Hopper**—Described in Bulletin 260 is a self-dumping hopper for low-cost handling of wet or dry, hot or cold, bulk materials. A variety of standard models are pictured and described in detail. Roura Iron Inc.

432 **Vertical Transportation**—Selection of vertical transportation for every traffic-moving job is detailed in 32-pp Bulletin A-382. Various types of elevators and escalators for a variety of commercial and industrial applications are described and illustrated. Otis Elevator Co.

433 **Industrial Casters**—Catalog 159 contains 24-pp of illustrations, descriptions and specification data on swivel-plate and rigid-plate truck casters for industrial applications. Includes detailed information on spring-action casters, V-grooved casters, grease-sealed casters, scaffold casters, floor truck locks, industrial wheels, and others. Faultless Caster Corp.

CONSTRUCTION

434 **Foundation Pipe Piles**—Comprehensive information on Taylor Forge spiral-weld foundation pipe piles is presented in 24-pp Form F-5677. In addition to detailed specifications, the illustrated booklet describes a number of pipe-pile installations and includes driving logs. L. B. Foster Co.

435 **Replacement Glazing**—Twelve-pp Booklet PL-251 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic, Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems, this practical

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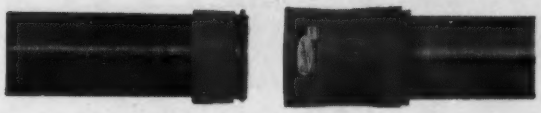
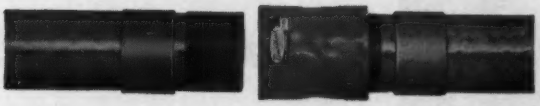


fiber-glass reinforced

epoxy pipe by Amercoat•



... strong as steel pipe, only one-eighth the weight. Tensile: hoop 80,000 psi, longitudinal 40,000. Highly corrosion resistant. Won't scale, cold flow or deform. 20-foot lengths easy to cut and join; threaded or locking wedge fittings.

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Model 0521

GAST rotary vane AIR PUMPS

— Vacuum or Pressure —

- **Four sizes—Built-in motors**
- **Compact, portable, reliable**
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To reduce weight, save space and cut costs—use Gast Integral-Motor-Pump Models! Fitted for vacuum—or as air compressors. For oil-free air, some offered with oil-less construction. Very compact and dependable. Positive displacement.
Used as original equipment on instruments, test units, etc. Capacity from ½ to 3.8 cfm; to 28" vacuum or to 25 psi.

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• AIR MOTORS TO 7 H.P.
• COMPRESSORS TO 30 P.S.I.
• VACUUM PUMPS TO 28 IN.

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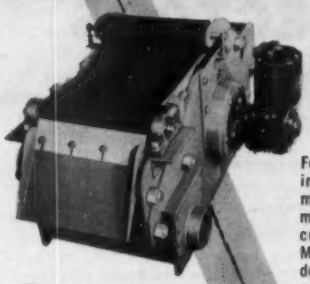

1 MAGNETIC CLEANING

Ferrous metal particles produced in grinding, honing and other machining operations are removed from any type coolant or cutting oil by the "GALE" Magnetic Separator. Solids are delivered near-dry for easy disposal.

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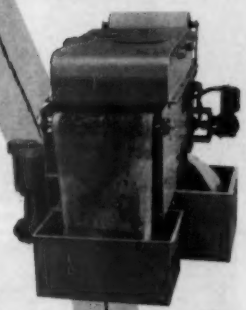
Ferrous and non-ferrous metals as well as non-metallic solids are removed from coolant liquids with equal efficiency by the IMPINJO® Filter. An automatically controlled moving filter medium simplifies disposal of waste solids.



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Grinding and polishing to a low micro-inch finish requires abrasive-free recirculating coolants. Diatomaceous filtration removes surface-damaging micronic and colloidal solids. Recommended for aluminum rolling oils and other industrial filtering problems.

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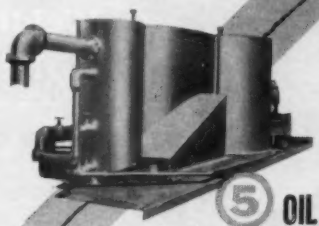
Centralized cleaning to serve many machines using the same coolant is accomplished by flotation and sedimentation. The SEDI-FLOTOR® Clarifier is available in capacities for any coolant flow requirement.



5 OIL SEPARATION

Free un-emulsified oil and grease contamination in liquids is eliminated by the "GALE" Interceptor-Separator. Oils are removed and separated liquid is discharged.

The GALE Separator Co. is a Division of INFILCO Inc., world leaders in liquid treating equipment.

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leading manufacturers* insist
on DUSTEX COLLECTORS

DUSTEX miniature cyclone tubes, cast of white iron, provide an ultra-hard, cling-free, self-cleaning surface to assure maximum material recovery at a constant, high-speed rate.

DUSTEX patented design prevents condensation within the collector when inlet temperature is above the dew point. Handles temperatures up to 800°F. There are no filters to clog, no sludge to pump. It's virtually maintenance free!

LOW INSTALLATION COST and up to 99.8% efficiency make DUSTEX the perfect collector for spray dryer, rotary dryer or flash dryer processes.

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DATA FILE

(Begins on page 292)

booklet gives properties of this sheet. Plastic Dept., Rohm & Haas Co.

436 Functional Glass—Advantages of company's rolled, figured and wired glass for vertical sidewall and skylight glazing are detailed in Catalog 59-G, 20-pp. Describes types suited for commercial, institutional, industrial applications. Provides properties. Mississippi Glass Co.

437 Retaining Walls — Sixteen-pp Catalog RW-3558 presents all-steel bin-type retaining walls for slope control retention of built-up land, erosion control and other earth retention jobs. Includes technical data, drawings, applications and case histories. Armco Drainage & Metal Products, Inc.

438 Unit Wall Construction — Twelve-pp Technical Bulletin UW-100-5 describes and illustrates application of company's Uniwall for complete single unit, moderate cost, wall construction in buildings of all types. The bulletin contains construction details. Natco Corp.

439 Fir Plywood—This 34-pp construction guide contains full-page structural drawings providing basic information on types, grades, and applications of fir plywood. Booklet covers information on floor construction. Douglas Fir Plywood Assn.

440 Fire-Resistant Resin—Structural panels, skylight louvers, chemical ductwork and other products made of Hetron, permanently flame-resistant polyester resin are covered in this illustrated bulletin. Table lists characteristics and suggested specifications. Durez Plastics Div., Hooker Electrochemical Co.

441 Aluminum in Colors—This bulletin introduces Alcoa's Alumalure colored aluminum architectural building sheet products, a complete line of sheet products offered in 11 colors. Aluminum Co. of America.

442 Guide to Shelving — To assist plant engineers in selecting proper shelving for all storage requirements, 64-pp Catalog 30 offers detailed suggestions for correct shelving and storing materials, loose and packed parts, record files. Shop equipment and storage cabinets are also described and instructions included for planning of stockrooms. Deluxe Metal Products Co. Royal Metal Mfg. Co.

443 Cold Storage Doors — Power operated and hand operated cold storage doors are illustrated and described in Catalog 259. Door construction features are detailed, and installation and specification data furnished. Clark Door Co., Inc.

444 Steel Floor Plate — Skid resistance and other advantages of USS multigrip rolled steel floor plate are

GLOBE SAFE·GARD EXPANDED METAL PARTITIONS with exclusive QUIK-ERECT patented fittings

(FORMERLY HILMAR)

...will answer all your enclosure problems

Here is the new, easier, simpler method of guarding conveyors and machines and for all in-plant partitioning. Shipped READY for erection, no cutting, drilling or welding required . . . these interchangeable expanded metal panels provide greater safety, cut overall costs, cover a wider range of use and require 85% less storage space.

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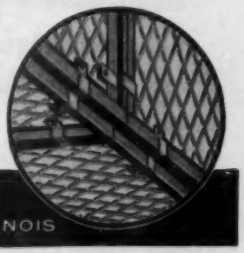

Note enlarged detail showing SAFE·GARD Quik-Erect Clips securely joining the interchangeable panels.

Write today for more details or call your Globe (Grip-Strut) Distributor.
Distributors in all principal cities, listed under "Grating" in your phone book.

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PRODUCTS DIVISION | **THE GLOBE COMPANY**
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One of a series

Let's get clear on— WHAT ENGINEERS DO

Simply stated, engineers apply the sciences to give people use of nature's materials, forces.

Scientists make it known. Engineers make it useful.

Scientists split the atom; engineers design and build the atomic power plants.

All science known would benefit nobody if not applied by engineers to manufacturing, construction, mining, agriculture or the generation of power.

These are the great engineered industries—all based on scientific knowledge.

Engineers plan, design, produce, maintain and *operate.* To repeat: *Scientists make it known. Engineers make it useful.*

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A Wasteful "GOOF-OFF"?

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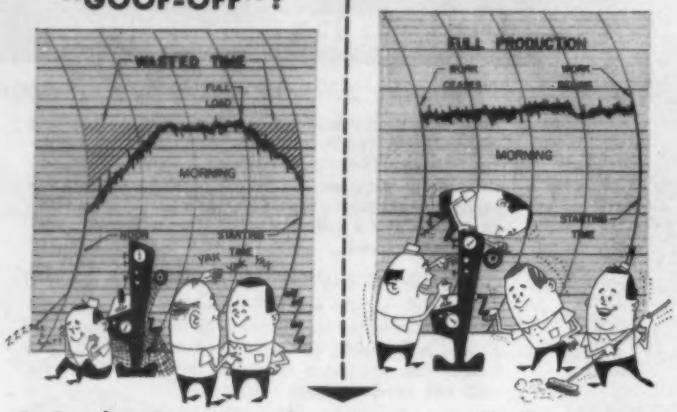

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DATA FILE

(Begins on page 292)

stressed in this illustrated bulletin. Also gives dimensions, data on loads. United States Steel Corp.

445 Non-Slip Flooring—Algrip, an abrasive rolled steel flood plate described as non-slip even on steel inlines, is the subject of Booklet AL-29, 8-pp. Discusses safety features, fabricating. Alan Wood Steel Co.

446 Aluminum Grating — Featured in this 8-pp bulletin is a line of aluminum grating designed for a variety of industrial applications. Safe load tablets and dimensional data and diagrams are included. Kerrigan Iron Works, Inc.

447 Safety Grating—Steel, aluminum and stainless steel safety grating for a variety of industrial applications is featured in illustrated 24-pp Catalog 5911. Shows typical installations, and includes complete engineering data for erection, as well as load charts. The Globe Co.

448 Grating and Treads—Bulletin 2566 is a revised illustrated bulletin on grating and treads for a variety of applications. Presents descriptions of electro-forged, riveted, rectangular, diagonal, U-type and T interlocked grating and treads. Tables of safe loads and information on specifying are also included, as well as application photos. Blaw-Knox Co.

INSULATION

450 Insulation Coating—This 32-pp illustrated handbook, Form L-17, presents the advantages of company's No-Drip insulation coating for preventing condensation drip from metal, concrete, brick, wood, plaster, or composition surfaces. Lists applications. J. W. Mortell Co.

451 Piping Insulation — Seven-pp Bulletin SO 1054 features a snap-on, one-piece molded pipe insulation of fine glass fibers for hot or cold piping. Specifications are given for industrial, commercial, and institutional piping. Gustin-Bacon Mfg. Co.

452 Building Insulation—Twenty-pp Booklet FB-105 contains descriptive information on uses of cellular glass insulation on roofs, parking decks, core walls, wall linings, curtain walls, perimeters and ceilings. It contains drawings and specifications for typical applications, as well as technical data and charts. Pittsburgh Corning Corp.

INSTRUMENTS, CONTROLS

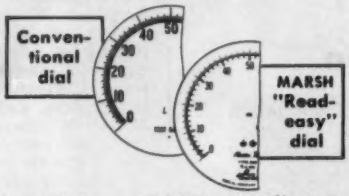
453 Precision Instruments—Catalog G1 contains 32-pp of comprehensive information on indicating, recording and controlling instruments. Contains potentiometers, pyrometer supplies, descriptive and illustrative data on systems and components, null indi-

New MARSH "Master-Test" SERIES

Twin-tip pointer enables observer to read "dead-on" by lining up twin tips like gun sight.

Unprecedented accuracy and dependability in test gauges developed to meet today's exacting requirements. Each gauge individually *dead-weight tested!* Guaranteed accurate within ¼ of 1% plus or minus of maximum dial reading over entire range.

Mirror dial also insures accurate "dead-on" reading.



New "Read-easy" dial (patent pending), as illustrated above, assures reading accuracy in keeping with indicating accuracy. Also note three advanced means of reading available in all "Master-test" gauges: twin-tip pointer, mirror dial, and "non-parallax" dial as shown opposite.

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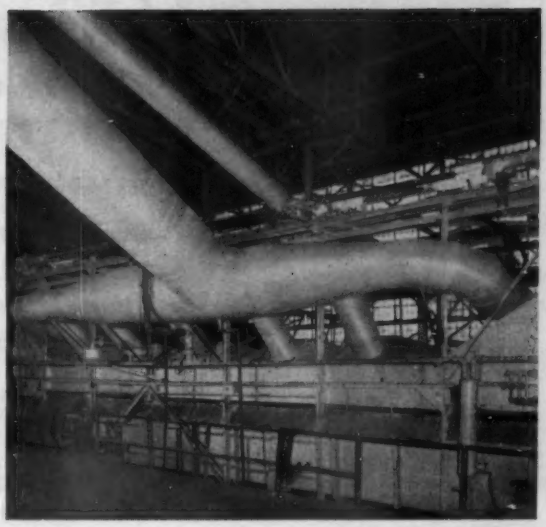

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... Inside and out

Use du Verre Resin Bonded Fiberglass Construction

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DATA FILE

(Begins on page 292)

cators, amplifiers and oscillographs, pressure gages, flow and liquid level meters, pneumatic remote transmission, thermometers, panelboards, valves, diaphragm motors, motor and dampers, switches, etc. Minneapolis-Honeywell Regulator Co.

454 **Controls for Automation**—Automation Controls Catalog, 44-pp, groups together a wide selection of automatic controls most commonly used in designing automatic systems. Includes such items as counting devices, switches, electric valves, actuators, relays, limit controls, time switches and accessory equipment which can be used as building blocks in selecting components for tailoring system. General Controls Co.

455 **Meters Regulators, Valves**—Bulletin C-5000, 28-pp, describes and illustrates meters, regulators and valves for a wide range of services. They include gas meters, gas pressure regulators, industrial meters, water meters. Information includes application suggestions, specifications and references to more detailed product literature. Rockwell Mfg. Co.

456 **Turbine-Type Flowmeter**—Described in this 8-pp bulletin is a turbine-type flowmeter for bulk plants, pipelines, refineries, chemical, food processing and other industrial services. The Potter-Bowser Meter Div., Bowser, Inc.

457 **Gages, Needle Valves**—Catalog 76-G consists of a loose-leaf bound collection of literature on gages and needle valves. Various types of gages are illustrated and described, with applications and specifications fully detailed. Jas. P. Marsh Corp.

458 **Motor Speed Controls**—Eight-pp. Form 927B features motor speed controls for adjustable-speed operation of d-c motors from a-c lines. Applications and advantages are listed, operating principle is detailed. General Radio Co.

459 **Vibration Recorder**—Bulletin K12A describes a small, non-electric, hand-held instrument which makes a tape recording of machine vibration amplitude. Applications are detailed and specifications included. The Korfund Co., Inc.

460 **Dial Thermometers**—Catalog 205 contains 12-pp of illustrated data on features and characteristics of a line of dial thermometers for industrial applications. Complete dimensional and specification data is included. United States Gauge, Div. American Machine and Metals, Inc.

461 **Mercury Bulb Elements**—Bulletin 851 describes the various types of mercury bulb elements which are the heart of all company's instruments. Basic principles, type and

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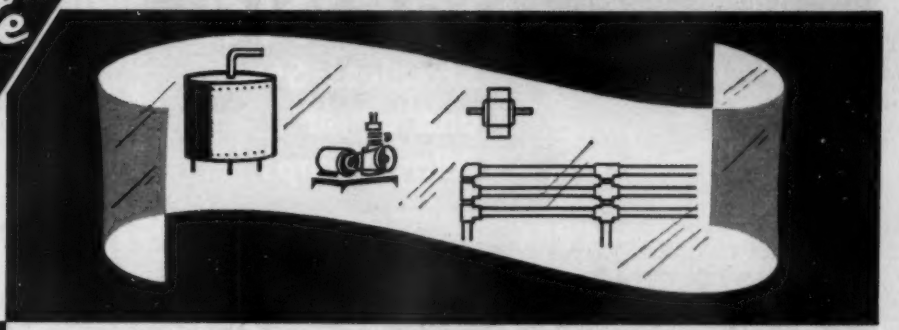

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Standard ROVALVES—stainless steel, plastic or alloys—perform a great variety of corrosion resistant services. In addition, the Rovang plant and staff are well equipped to design custom valves that will solve special corrosion problems. Remote Control or full Automation, as desired.

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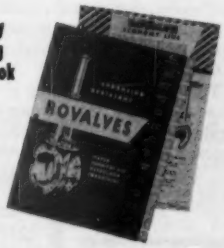

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Stainless Steel
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See Our Catalog in Sweet's Plant Engineer's File
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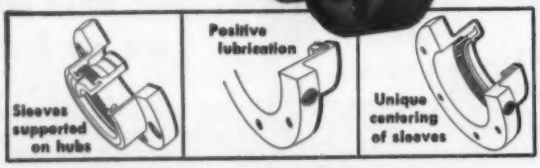

reduces downtime and upkeep for light-to-medium drives!

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The Model B coupling gives you the same features that have made Fast's the world's leading coupling for over 35 years. You get the same trouble-free performance, longer service life and lower maintenance costs. You also get prompt delivery because stocks are on hand to meet practically every need. Free engineering service is also available.

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DATA FILE

(Begins on page 292)

temperature ranges, plungers and interchangeability, element plunger types and other data are covered. The Partlow Corp.

462 For Limited Panel Space—Bulletin 532 describes Model 216 indicator used with company's automatic tank contents gage. Bulletin contains a full illustration of indicator which, although occupying a small space, has a scale 20 in. long. The Liquidometer Co.

463 Electronic Counters—Featured in this product bulletin is a line of high speed electronic counters. Various types of counters are illustrated and described and engineering details furnished. Veeder-Root Inc.

464 Graphic Instruments—How to make plant surveys with graphic instruments is the subject of 8-pp Bulletin 856. Advantages of systematic surveys with electrical recording instruments are detailed, types of instruments needed are described, and studies to be made are outlined. The Esterline-Angus Co., Inc.

LUBRICANTS, LUBRICATION

465 Lithium Greases—This product information bulletin presents manufacturer's six Litholine industrial greases, stressing industry advantages offered by these multi-purpose greases. Gives properties of greases, application and performance characteristics. Sinclair Refining Co.

466 Organized Lubrication—Benefits of organized lubrication are extolled in this 24-pp bulletin. Cost control opportunities are detailed and the task of assigning responsibilities and delegating authority in an organized lubrication system discussed. Method of determining savings and setting up records to measure results covered. Texaco, Inc.

467 Lubricant Data—Characteristics, advantages of company's line of specialized fluid and grease type lubricants are described in 32-pp Data Book 59-1. Includes sections on control of friction, use of grease type lubricants, proper applications, and recommendations for various operating conditions. Lubriplate Div., Fiske Brothers Refining Co.

468 Product Guide—This handy little booklet gives information on manufacturer's line of industrial products—general lubricants, greases, diesel lubricating oils, metalworking oils, hydraulic oils, heat-transfer oils, waxes, petro-chemicals, spray oils, solvents, others. Sun Oil Co.

BOILERS AND GENERATORS

469 Hot Water Boilers—Catalog HCC-2, 20-pp, describes and illus-

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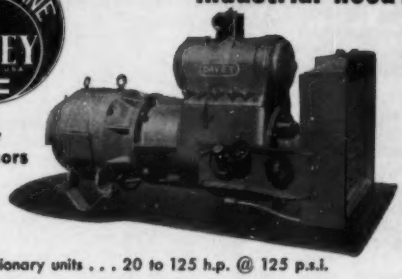
NEW... meets every industrial need!

Rotary Compressors



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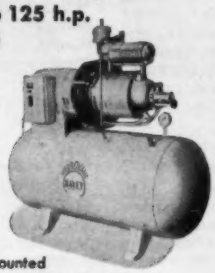

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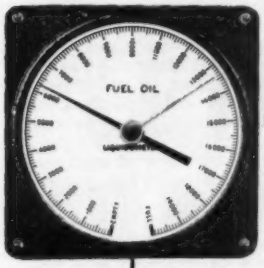

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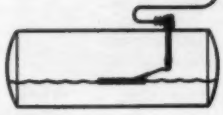

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Free-Flow SKY-BLAST® Roof Ventilators are *WEATHERPROOF!*

Even if the rain comes down in buckets, there's no need for weather covers on SKY-BLAST roof ventilators. In operation, the powerful airstream keeps out snow, rain and sleet. At rest, butterfly dampers form a water-tight seal, won't leak a drop. With no interfering covers, more air is moved at less cost. Fumes are thrown high in the air to prevent re-entry into the building and to eliminate roof maintenance problems created by other types of ventilators. Wind velocity or direction can't affect performance. Heavy gage steel surfaces are hot-dip galvanized for real sou'wester protection. With patented, non-clogging rainshed, low wind guard, rugged base and condensate drain, it's always fair weather beneath a SKY-BLAST. Wind tunnel proven ratings to 78,000 cfm. Send for bulletin 680—PE

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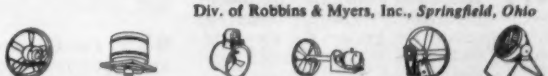

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DATA FILE

(Begins on page 292)

trates design, construction, advantages and economics of company's controlled circulation hot water boiler for supplying high pressure, high temperature water for heating systems and process applications. Combustion Engineering, Inc.

470 **Steam Generators**—Design and construction details on a packaged unit steam generator are presented in 10-pp Bulletin PSG-3. Fabrication procedures are illustrated and capacities, dimensions and weights tabulated. Henry Vogt Machine Co.

471 **Package Steam Generator**—This illustrated folder describes in detail features and advantages of company's line of package steam generators. Specifications are included. Cyclotherm Div., National-U.S. Radiator Corp.

472 **Steam Generator**—Bulletin 582 CS describes design and operation features of company's vapor water tube steam generator which differs from conventional water tube steam generators in that initial heating and final vaporization occur in the shell. TXT Texsteam Corp.

473 **Generators, Auxiliaries**—20-pp Catalog SB 60, on steam generators and allied equipment provides cross section views of major products to show design and construction. Standard and special boilers are included, also burners. Erie City Iron Works.

OTHER EQUIPMENT

474 **Cooling Towers**—Featured in 20-pp Catalog DFA-58 is company's double flow Aquatower, combining high efficiency with low silhouette. Specifications and engineering data are included, as well as dimensional drawings showing construction features. The Marley Co.

475 **Industrial Teflon Hose**—Bulletin 2140 describes advantages of Teflon and its applications in a variety of industries where resistance to temperature, pressure, corrosion and contamination is desired. Teflon hose specifications are included, as well as assembly procedure. Titeflex, Inc.

476 **Fire-Resistant Fluids**—This series of specification sheets describes company's line of fire-resistant fluids, including synthetic, oil-water emulsion, and glycol types. Physical characteristics and other data on each included. Socony Mobil Co., Inc.

477 **Industrial Finishing Equipment**—Catalog A657, 12-pp, describes modern finishing system for cleaning, rust proofing, drying, painting and finish baking. The R. C. Mahon Co.

478 **Fuel Burning System**—Eight-pp Bulletin 1255 lists 11 sizes of oil, gas and combination gas and oil burners for firing boilers or other heat exchange equipment. Cutaway views in full color show operating principles. Typical burner arrangements and some installations are also pictured. Orr & Sembower, Inc.

479 **Tripod Elevated Tank**—This illustrated bulletin describes the Horton tripod elevated water tank, designed to provide economical gravity water pressure for general service and fire protection in private water systems, others. Standard sizes included. Chicago Bridge & Iron Co.

480 **Laboratory Supplies**—This 12-pp price list announces the latest prices for a wide range of laboratory supply items, including water analysis sets, conductivity equipment, colorimetric comparators, laboratory glassware and supplies, chemical reagents. Betz Laboratories, Inc.

481 **Thermoplastic Polymer**—Information on the properties of Penton, thermoplastic polymer, is presented in this 6-pp brochure. Lists mechanical, electrical and chemical properties and describes molding methods. Hercules Powder Co.

482 **Preheating Combustion Air**—This well-illustrated 36-pp booklet explains fuel savings and increased performance made possible by using waste heat in flue gases to preheat incoming combustion air. Also covers increased boiler output, ability to use lower grade fuels effectively. Air Preheater Corp.

483 **Product Directory**—This Product Directory G-103 provides a basic source of information on company's divisions and products. Products are divided into major sub-groups—chain link fence, chemicals and coke, springs, belts, wire, wire cloth, etc. The Colorado Fuel and Iron Corp.

Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on pages 287 and 288.

484 **Electronics for Automation**—Catalog HB-5901 provides 64-pp of information on home study training courses covering electronic fundamentals and electronics for automation. Summarizes lesson material covered and educational objectives. Shows how course presents such subjects as applications of industrial electron tubes, motors and motor controls, power supplies and regulation, sensing and control devices, servomechanism components, recording and readout devices etc. Includes details on handling of assignments and test papers, awarding of certificates, cost of tuition. RCA Institutes, Inc.

485 **For Cleaner Furnace**—The use and application of Oxi Crystals to keep furnaces and the fireside of boilers free of slag, encrusted carbon, soot and fire-scale is described in a recent pamphlet. Oxi Corp.

486 **Coagulant Aids**—Featured in this product bulletin is a line of coagulant aids designed to improve floc formation in clarifying and softening water. Advantages are detailed. Calgon Co., Div., Hagan Chemicals & Controls, Inc.

487 **Visible Record System**—How visible record systems guide and control decisions—from sale and market analysis through engineering design, purchasing, cost, tool and die, shop parts and materials stores, and production—is told in this 12-pp bulletin. Various types of record forms are shown. Acme Visible Records, Inc.

488 **Gas Turbines**—Features of company's gas turbines designed to operate at conservative operating temperature are detailed in Bulletin 163-1. Specifications, dimensional data and diagrams are included. Clark Bros. Co.

489 **Special Equipment**—Featured in Bulletin 7-A is a line of custom-engineered air and hydraulic operated machines for a variety of industrial operations. Details of design and operation are described. Logansport Machine Co., Inc.

490 **Plant Behind the Product**—How one manufacturer of skin cleansers and related products has integrated its processing or mixing with its packaging lines is pictorially described in this reprint. Step-by-step tour of the plant illustrates advantages of the system. Sugar Beet Products Co.

491 **Release Agent**—Technical Bulletin 19 describes a release agent which can be rubbed to an imperceptible film for easy parting of epoxy resin castings from plaster molds, or from metal, wood, or epoxy masters. Covers methods of applying the material and includes prices. Smooth-On Mfg. Co.

492 **Industrial Equipment**—Featured in this 5-pp Bulletin is a line of equipment manufactured by this company, including such items as air release, can filters, capacitors, circulating lubrication systems, rate of flow controllers, dispensing outfits, filters, indicators, lubricating units, meters, oilers, pumps, valves, and other products. Applications stories are included. Bowser, Inc.

493 **Draft Starter**—Capacity data for Quickdraft units are presented in 8-pp Form QF-SD. Seven capacity tables provide means for determining capacity of standard units when installed under hundreds of different conditions. Quickdraft Co.

494 **Industrial Stack**—Detailed information on a permanent, low cost refractory smoke stack for commercial and industrial applications is contained in 8-pp Bulletin IS-32. Gives product information, applications with boilers, furnaces, etc. Van-Packer Co., Div., The Flinkote Co.

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ADVANTAGES

- 1 Lifter handles wide range of coil sizes
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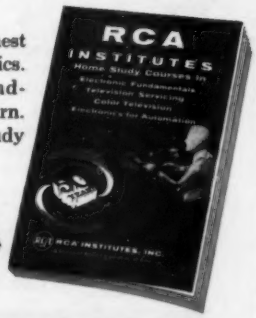

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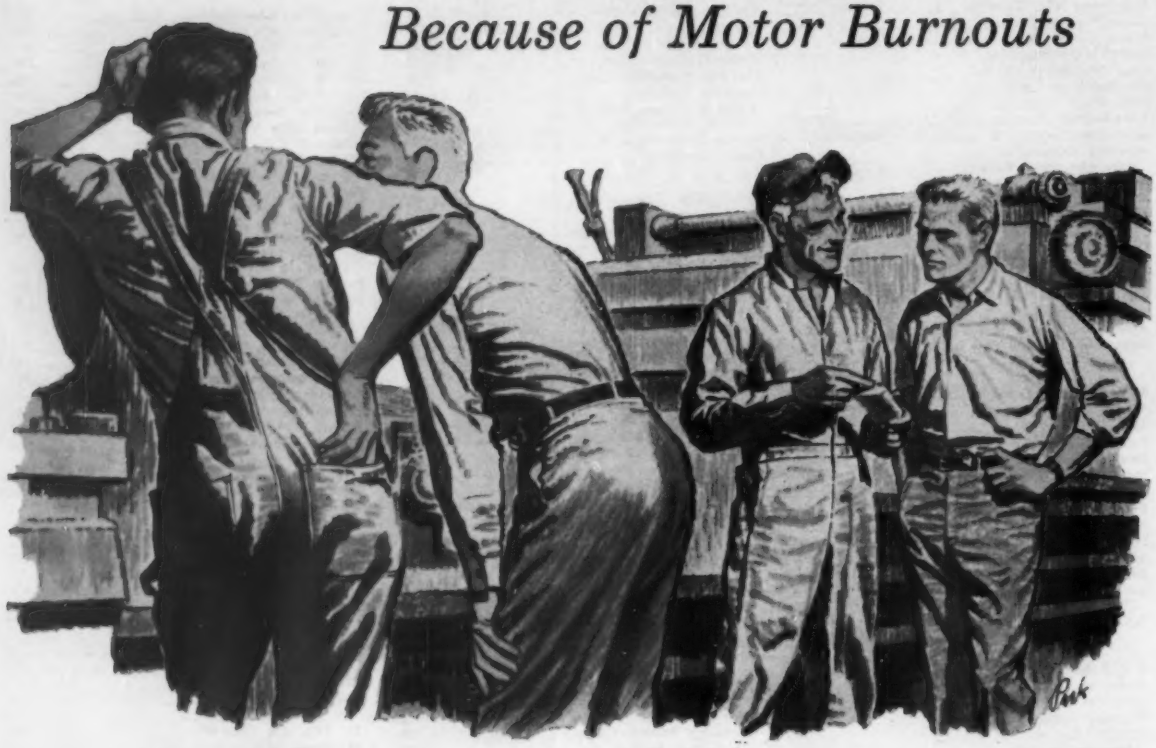
STOPPED

Because of Motor Burnouts



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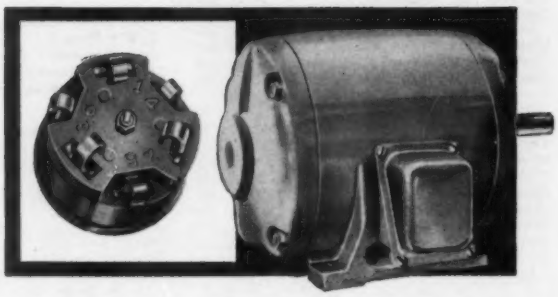

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Be sure you get everything you expect from motor protection — specify KLIXON protection when you order motors. For full information, check with your motor supplier's district office, or write us for a copy of our new Bulletin PR-1243 on KLIXON three-phase motor protection.

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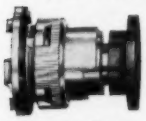
OIL-TIGHT OPERATORS

Standard Button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Selector Switch and Pushbutton Lockout

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